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MACWORLD

The Macintosh® Magazine March 1990 $3.95 Canada $4.95

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6 Product Comparisons

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5 PAINT PROGRAMS
PixelPaint Pro ... the Winner?

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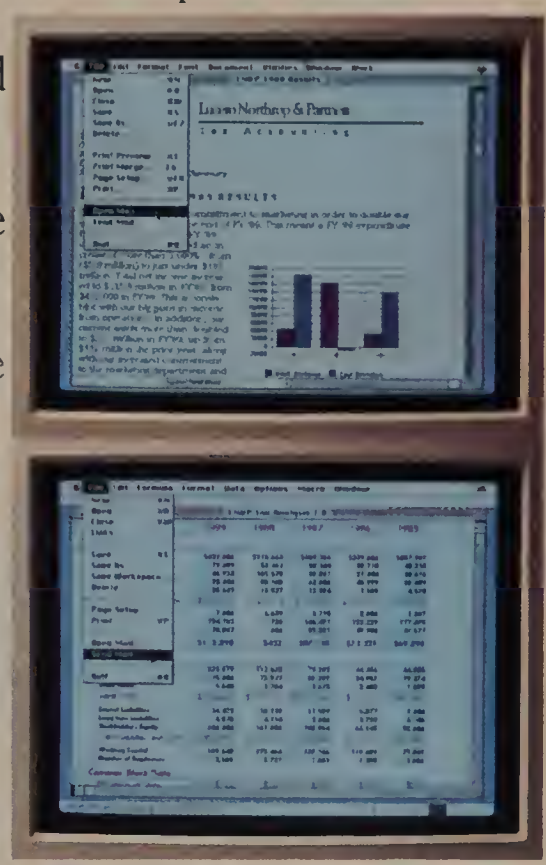

Microsoft Excel and Word now have built-in Mail support. So you can send documents without ever leaving your program. Or entering the hallway.

Now that we've covered some of the unique ways that Microsoft Excel, Word and Mail work together, we'd like to add one more significant point.

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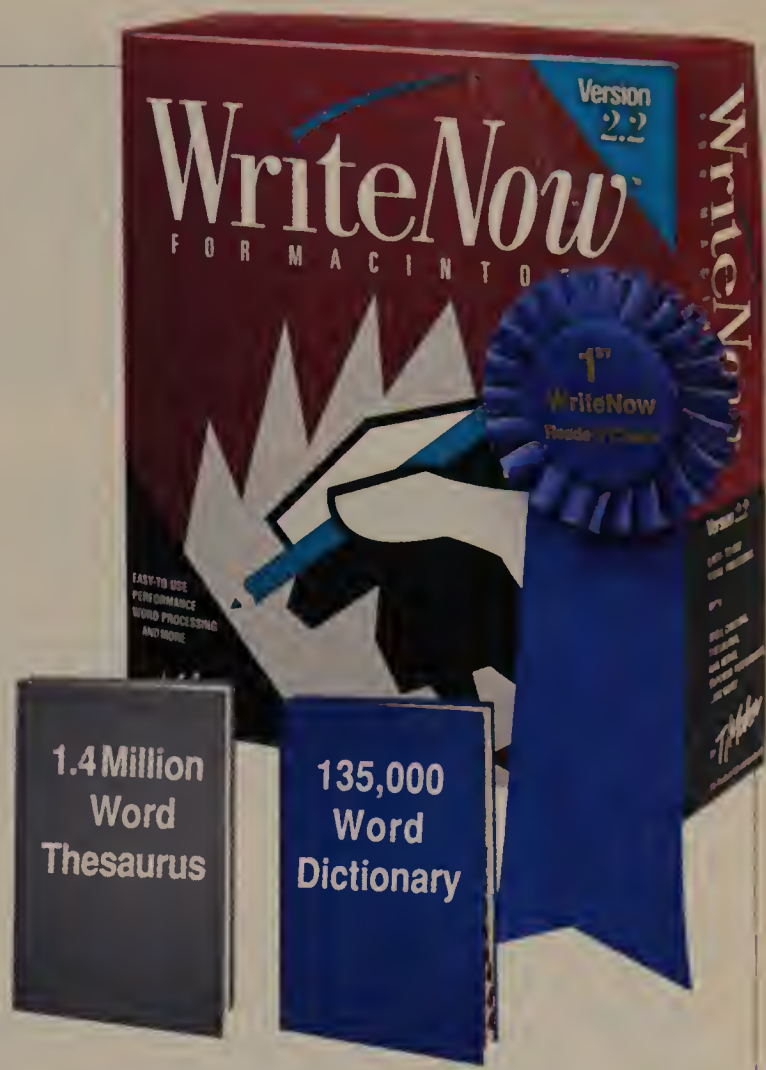

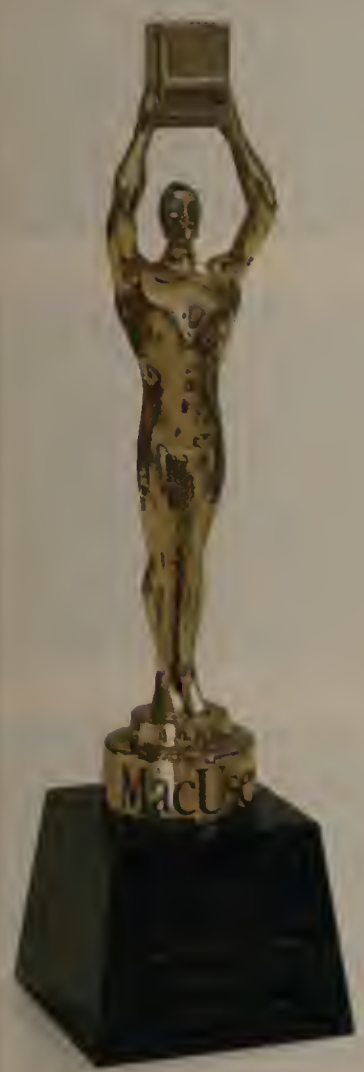

Reviews

"*WriteNow is the definitive Macintosh word processor. It's* ***easy to use, powerful, and comfortable****... Highly recommended.*
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1989 Editors' Choice Award,
'Best New Word Processor'—MACUSER

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#1 Rated *Word Processor in Macintosh 'PC Week Poll of Corporate Satisfaction.'*
—PC WEEK MAGAZINE

Comparison of Leading Word Processors

	WriteNow 2.2	MacWrite II	Word	Works
Actual disk space needed:	**(2) 800K**	Hard disk	Hard disk	Hard disk
Thesaurus:	**1.4 million**	220,000	220,000	No
Spell Checker:	**135,000**	100,000	130,000	60,000
Mail Merge:	**Yes**	Yes	Yes	Yes
Format Accelerators:	**Yes**	No	Yes	No
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24-Bit Graphics Systems A
Looks Are Impressive, B

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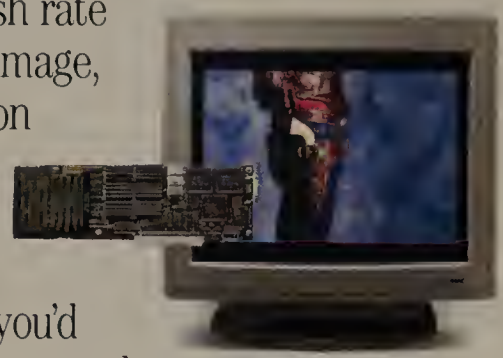

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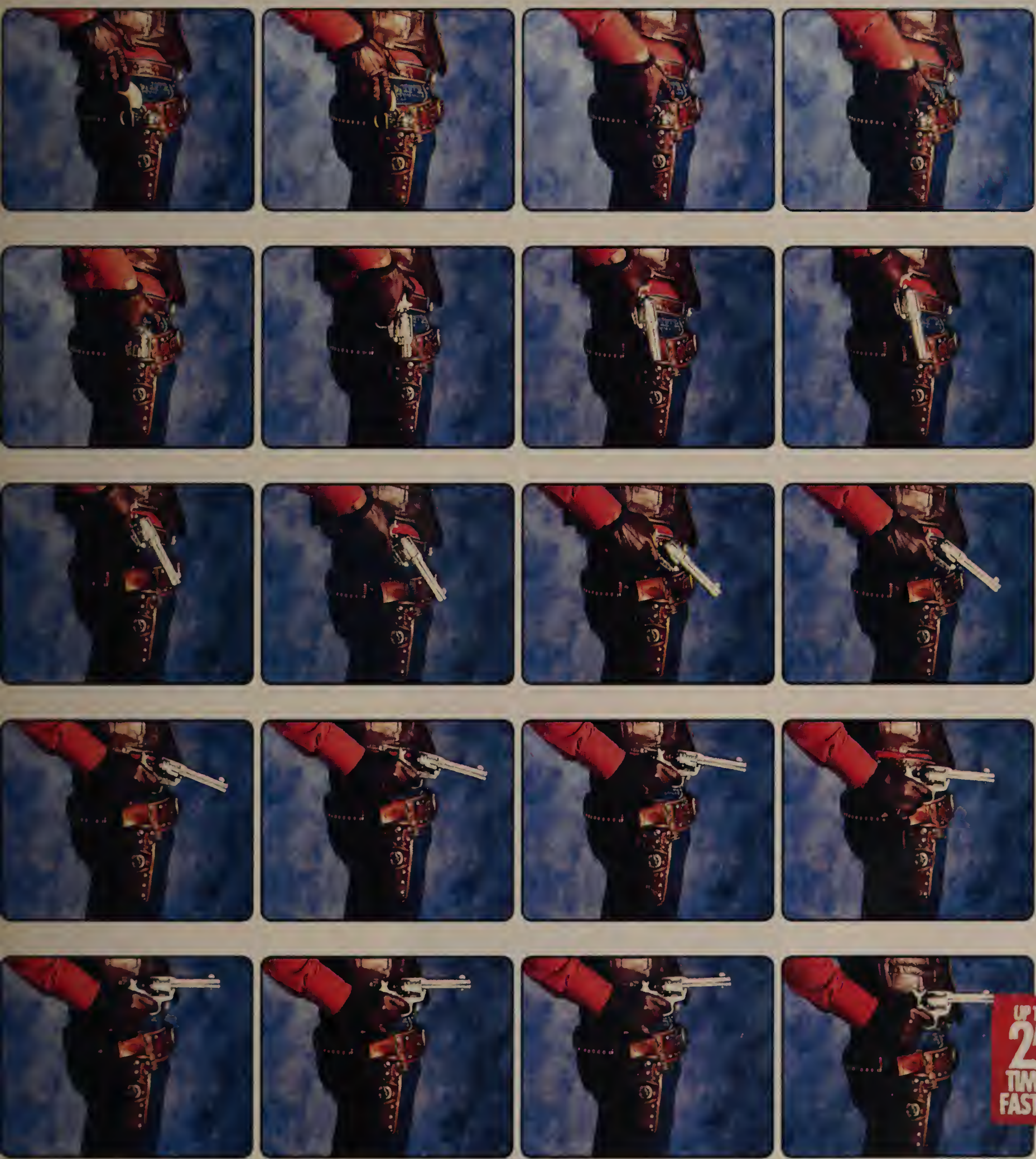

Images shown are actual screen-images photographed directly from a SuperMac 19" display. Original photography was scanned with a Barneyscan 24-bit scanner into PixelPaint Professional running on a Macintosh IIx equipped with a Spectrum/24 Series III graphics card.

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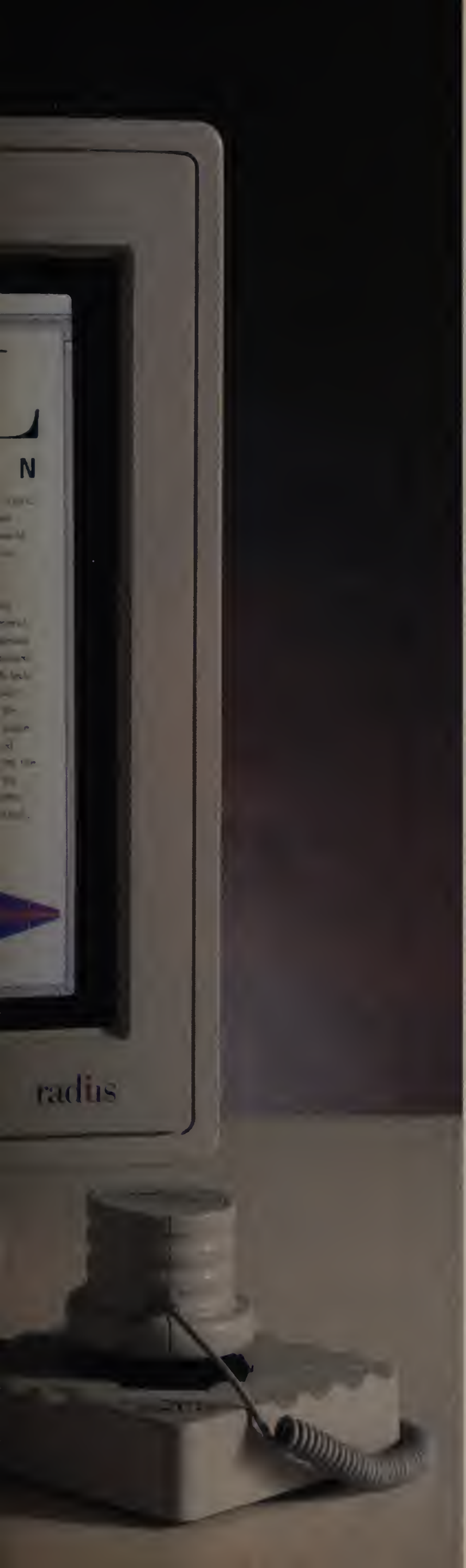

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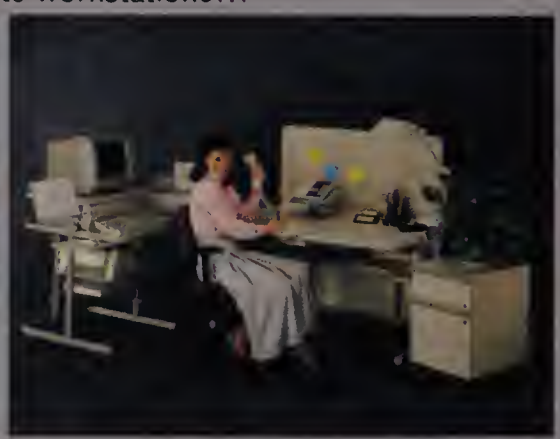

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Introducing

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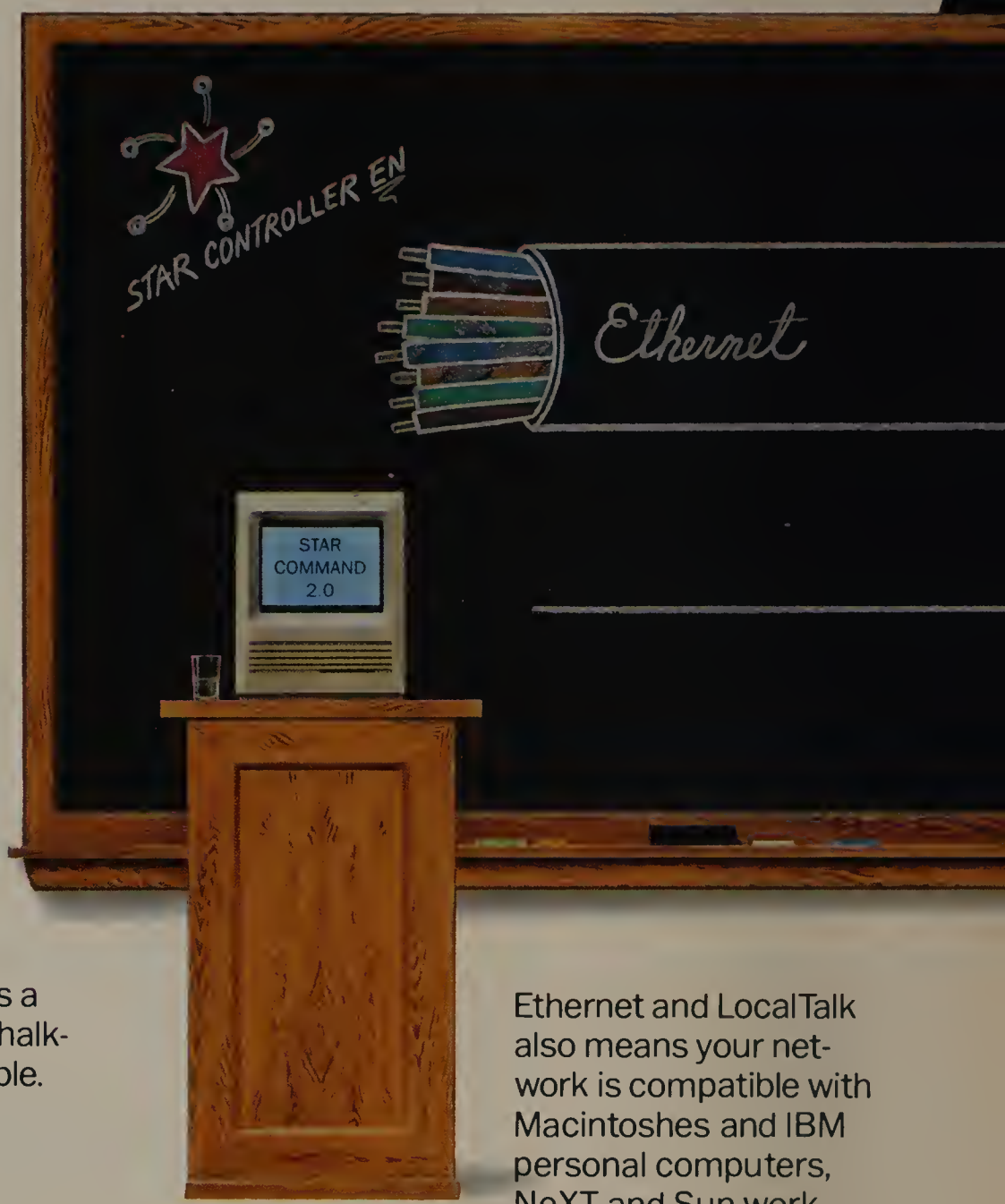

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The PhoneNET System just got a lot faster. Farallon's PhoneNET StarController EN and PhoneNET StarConnector EN let you run Ethernet at 10 mbps over ordinary twisted-pair telephone wire.

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If you think hybrid networks make sense, here's an even more sensible idea: active star networks over twisted-pair telephone wire.

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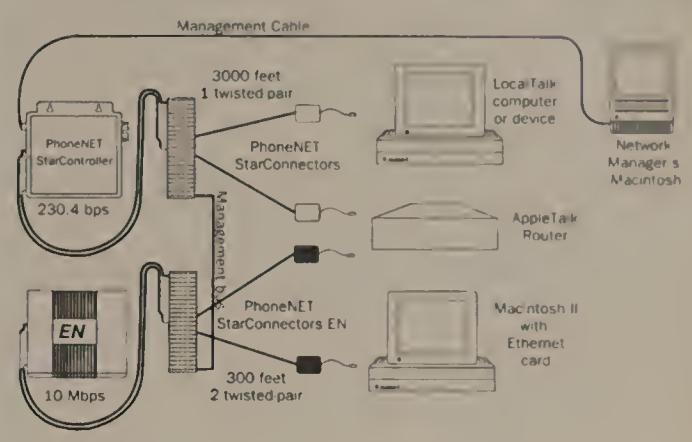
Which means if you already have a LocalTalk network using the PhoneNET System, then creating a hybrid LocalTalk/Ethernet network should be easy.

g eithernet.



StarController EN:

- Standards: IEEE/CCITT 802.3 Ethernet
- Supports 12 branches of 328 feet each
- AUI interface for connection to coax based Ethernet LANS
- Diagnostic LEDs for power, ROM, RAM, and to indicate packet transmission to each port
- Interconnect multiple StarControllers EN to support up to 1,024 users

Manage to stay in control with StarCommand 2.0.

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You say Ethernet, we say Eithernet.™

Look at it this way. Even if you're doing more things on AppleTalk than ever before, chances are only some of your people are facing critical mass. Everyone else is perfectly happy and productive. So rather than installing Ethernet everywhere, maybe you should consider running both LocalTalk and Ethernet. At the same time. Over the same network cabling. With the PhoneNET System.

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It's WIZ™ by CalComp. A new mouse that's so different, we hesitate to even call it one. Because it combines all the easy-to-use features of a mouse and stylus with the power of an "intelligent" graphics pad to enhance every pointing, tracing and drawing function you do.

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W I Z

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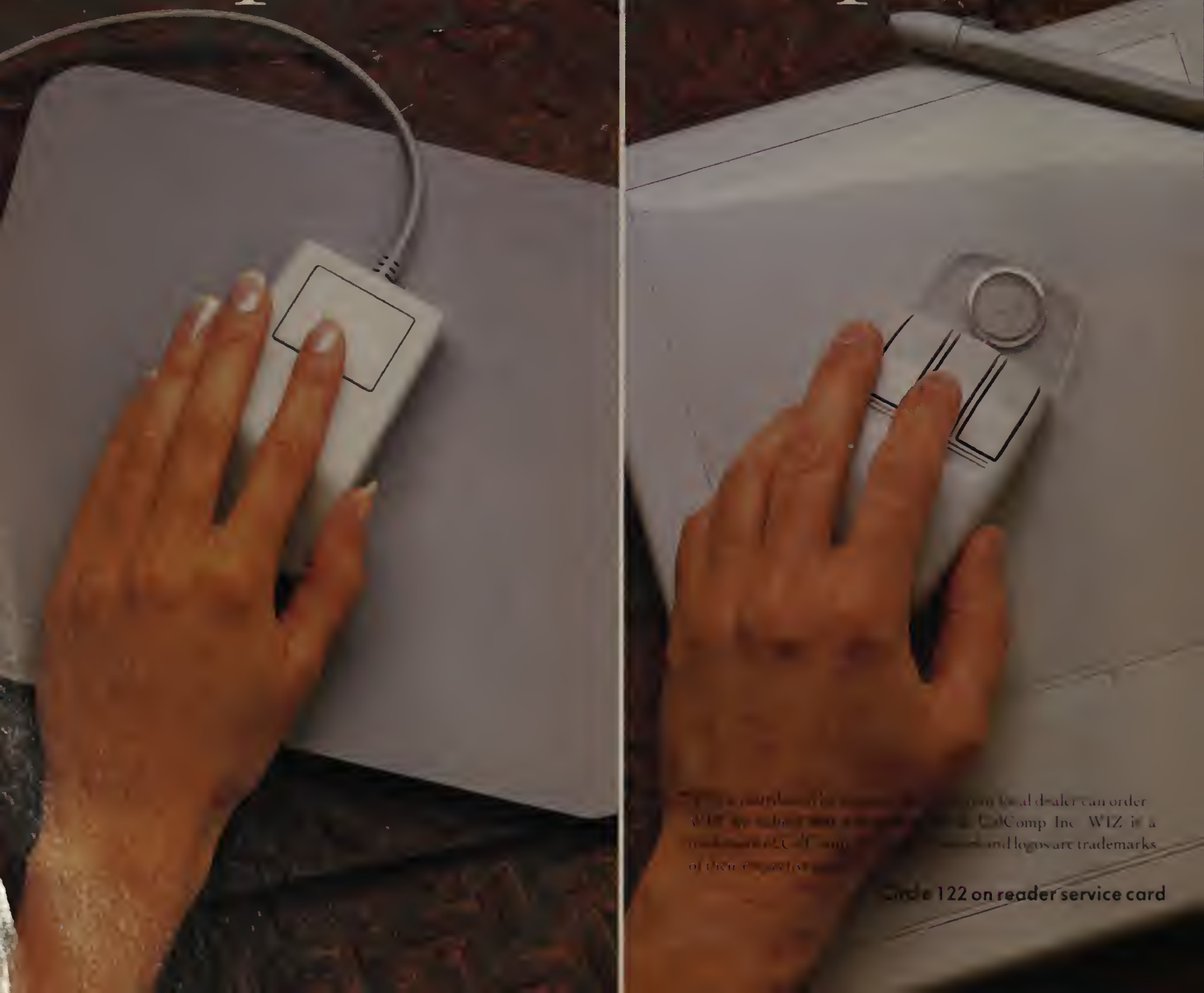

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Circle 122 on reader service card

MacBulletin

The World on a Data String

A World Factbook CD ROM containing maps of the world, lists of international organizations, and 256 profiles of different geographic regions is now available from Wayzata Technology. The profiles include socioeconomic, geopolitical, and demographic information on specific countries. The CD ROM lists for $99, with discounts for schools, libraries, and dealers. For more information, call Wayzata Technology at 612/460-8438, or 800/735-7321.

Thunderware's Aid to Scanning

Thunderware says it has begun shipping a plastic guide to help hand-held scanners scan in a straight line. Called SnapGuide, the device fits Thunderware's LightningScan and Logitech's ScanMan and makes it easier to accurately scan objects that require two passes. SnapGuide is available for $14.95 but is being sent free to all registered owners of LightningScan. For more information, call Thunderware at 415/254-6581.

New Virus Crashes onto the Scene

The new WDEF virus differs from other viruses by riding in the Desktop file instead of in applications or System files, so that it may spread immediately when an infected disk is inserted. Symantec Anti-Virus Utilities programmer Paul Cozza and a spokesperson for HJC, which publishes Virex, said WDEF was intended to be harmless, but is incompetently programmed and can cause crashes, especially on the Mac IIci. SAM 1.3 and Virex 2.3, both updated to protect the Mac's Desktop file, should be available now. The freeware Disinfectant 1.5 is also effective against WDEF.

OmniPage Add-ons Provide New Capabilities

Four new products from Caere extend optical character recognition. OmniProof compares word processing documents, searching for changes between versions; OmniSpell is designed to catch errors common to OCR; OmniTrace converts bitmapped images to Encapsulated PostScript format and provides some editing tools; OmniDraft performs OCR on draft-mode dot matrix printer output. OmniTrace and OmniDraft list for $100 each and require OmniPage. OmniProof and OmniSpell list for $150 each and work without OmniPage. For more information, contact Caere at 408/395-7000.

Reference Readies Grammatik Mac

Reference software claims its new Grammatik Mac looks for 10,000 kinds of writing problems, ranging from two commas in a row to redundancy and wordiness. You can turn editing rules on or off, proofread files against several styles, and chart the program's analysis of your sentences. Grammatik Mac reads Microsoft Word, WordPerfect, MacWrite, and WriteNow. It will list for $99. For more information, contact Reference Software at 415/541-0222.

Network Courier for Mac

Consumer Software is entering the Mac market with an interface to its DOS-based E-mail package. Network Courier for the Mac will run on LocalTalk networks connected to Novell, Banyan, 3Com, and other IBM PC servers. Network Courier supports many different protocols, including MCI Mail, X.400, SNADS DISOSS, PROFS, and SMPT, and can create simple aliases for long lists of complex addresses. The Mac product will be an application, not a desk accessory. Pricing had not been decided at press time. For more information, contact Consumer Software at 604/688-4548.

Niles to Abstract Mac Magazines

The people who publish the bibliography package EndNote are using their information-management product to publish Mac-related information. The first edition of MacInfo will include an EndNote database with abstracts of 2800 articles from *Macworld*, *MacUser*, and *MacWeek*, and the database will be updated monthly by subscription. Users can browse MacInfo, but to make changes will require a full working version of EndNote. MacInfo will list for $99 a year. For information, contact Niles & Associates at 415/655-6666.

Mac-DOS Syzygy Approaches

Information Research is developing a version of Syzygy that will allow Macs and DOS machines to work together. Syzygy, which currently runs only under DOS, enables networked users to manage and coordinate group tasks by integrating data from project managers, spreadsheets, and word processors in a shared relational database. The Mac-DOS version of Syzygy is scheduled to ship in the fall of 1990. For more information, contact Information Research at 804/979-8191.

Apple Ships CL/1 Server

After a long delay, in December Apple began shipping the CL/1 Developer's Toolkit for Macintosh and the CL/1 Server for VAX/VMS, the first two components of CL/1. Apple also announced CL/1 Servers for IBM's

(continues)

Database 2 (DB2) and SQL/DS database-management systems would be available in the first quarter of 1990. Developed by Network Innovations (acquired by Apple in March 1988), CL/I is an extension of Structured Query Language (SQL) that allows client Mac applications to access data on host-based servers. The CL/I Server for VAX/VMS systems is priced at $5000 per CPU or cluster; the CL/I Developer's Toolkit, which helps programmers build CL/I support into applications, costs $695 per single-user license. Both are available from the Apple Programmers and Developers Association.

Apple Offers Phase 2 Support for AppleTalk for VMS

Apple announced that in the first quarter of 1990, it will provide AppleTalk Phase 2 support for VMS via AppleTalk for VMS version 2.1. Phase 2 increases the number of possible nodes on a single AppleTalk network from 254 to over 16 million. Codeveloped by Apple and Pacer Software, AppleTalk for VMS provides AppleTalk network protocols to Digital Equipment Corporation VAX computers running the VMS operating system.

Xerox Sues Apple for $150 Million

After years of silence, Xerox Corporation has sued Apple for $150 million for allegedly misappropriating interface technology developed in the late 1970s at Xerox PARC (Palo Alto Research Center). Xerox is widely acknowledged by Apple and the industry as the originator of such interface standards as icons, pull-down menus, scroll bars, and the mouse. Apple representatives describe the suit as being without merit. The representatives said that the Lisa and Macintosh interfaces are in part expressions of ideas created at PARC, but that ideas are not copyrightable. Expressions of ideas—that is, the specific implementations—are copyrightable, an Apple spokesperson says. Numerous observers noted that the Xerox suit may add to Apple's problems with its suit against Microsoft and Hewlett-Packard. Apple is suing those companies for infringing on Apple's interface copyrights. The long delay between the introduction of the Macintosh and the Xerox suit will likely be to Apple's advantage, however, with some observers linking the timing of the suit to the recent appointment of former IBM executive William Lowe as president of Xerox.

Apple Clarifies System 7.0 Features

As promised, in December Apple announced the features that will be included in the much-anticipated System 7.0. Due out sometime in the summer of 1990, System 7.0 will include a new Finder; Interapplication Communications Architecture; and Outline Fonts, the technology Apple intends as a substitute for PostScript. The new Finder will add Macintosh FileShare, which permits file sharing without a dedicated file server. The new System will also incorporate the Database Access Manager, Virtual Memory, and 32-bit Addressing. Virtual memory is a disk-caching scheme that makes space on a hard disk seem like central RAM. Virtual memory requires a 68030-based Mac, or a Mac II with a PMMU chip added. The 32-bit addressing will permit a theoretical addressing limit of terabytes of memory (trillions of bytes), instead of the current theoretical limit of 128MB. Apple will also ship the Communications Toolbox, a developer's aid, with 7.0.

A DA with Style

Microlytics will publish a Mac version of Strunk and White's *The Elements of Style*. The desk accessory will be a simple online reference work, but it will have hooks to a grammar checker that Microlytics is developing, so that you can immediately get appropriate information about style while using the grammar checker. The as-yet-unnamed DA should be available second quarter 1990. For more information, contact Microlytics at 716/248-9150.

Apple Increases Phone Support

Apple is implementing toll-free phone support for developers, and considering offering phone support directly to end users. Expanded phone support for developers is scheduled for January. The service, called the Apple Technical Answer Line, has two $1175-per-year options, one for networking and communications, and one for A/UX. Apple is also considering adding other services, including one for noncommercial developers.

Voyager Moves into the Stars

Version 1.2 of Carina Software's sky simulator, Voyager, adds some new features for amateur and not-so-amateur astronomers. You can now choose your location on Earth by clicking on a globe or by selecting a city from a scrolling list; change star magnitudes to make dimmer stars visible; see a grayed-out image of stellar objects below the horizon, and add objects, up to your Mac's memory limits. Carina is also working on a color, Mac II–only product to be called Voyager II, as well as a Mac-driven telescope controller. For more information, contact Carina Software at 415/352-7328.

ISDN Put to the Test

Northern Telecom is testing an Integrated Services Digital Network (ISDN) link between its internal network and public ISDN networks from U.S. Sprint and MCI. ISDN provides much greater bandwidth than normal telephone lines and can transfer voice and digital data at the same time, making it useful for multimedia applications. Northern Telecom plans to use ISDN's videoconferencing, electronic data interchange (EDI), Group 4 fax capabilities, and other services.

North Edge News

North Edge Software is changing its name to match its principal product, Timeslips. The renamed Timeslips Software is preparing a version 2.0 upgrade of its Timeslips III time-billing product that will provide a drawing environment for designing forms, handle recurring charges, and provide much more flexible reports. A five-user package will list for $699. For more information, contact Timeslips Software at 508/768-6100 ■

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Who says SuperPaint 2.0 is so great?

"...for plain old drawing and painting, you can't beat SuperPaint."
Erfert Fenton, **Macworld**, August 1989.

"SuperPaint 2.0 is, without a doubt, the best upgrade I've ever paid for."
Dan Gookin, **ComputorEdge Magazine**, March 10, 1989.

"SuperPaint remains the best black and white graphics program around."
Laurie Wigham, **Publish!**, August 1989.

"I've decided it's a better overall product than Canvas... SuperPaint has more to offer."
Robert Art Morgan, **ComputorEdge Magazine**, June 30, 1989.

"...one of the most intuitive implementations of Beziers I have seen."
Carlos Martinez, **MacUser,** July 1989.

"SuperPaint offers quantity, quality, and depth in each of its options."
DataPro's Microcomputer Lab staff, **DataPro Research Letter**, April 1989.

"It's a godsend for simple art."
Tom Thompson, **BYTE**, June 1989

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Claris Revisited

WHATEVER HAPPENED TO THE COMPANY PEOPLE LOVED TO HATE?

BY JERRY BORRELL

At first glance it looks like a high-tech shopping mall. A three-story-high atrium extends the city-block length of the building. Thin steel girders supporting triangles of glass in the style of I. M. Pei allow the bright Silicon Valley sunlight to flood the entire space. A concrete obelisk, actually a fountain, rises within the atrium and spills water down its sides with a quiet rush of sound. Bays of offices open onto the central atrium. People come and go singly or talking animatedly in small groups, but there is surprisingly little sound in the building. It's more like an academic think tank than the Sunnyvale, California, headquarters of the seventh-largest personal computer software company in the United States. (That's an estimate—as a part of Apple Computer, Claris's earnings are not available to the public.)

Bill Campbell, the company president, is responsible for the future of the 380-odd people who this year produced and sold over $65 million in Macintosh software. It has been more than a year since Campbell initiated his self-imposed withdrawal from most public appearances. The cause was a raft of unfavorable articles that appeared in magazines such as *Macworld* and *BusinessWeek*.

During the early establishment of Claris, Campbell had gone out of his way to meet and talk with the press about Claris and his visions for its bright future. For its part, the press, most notably *BusinessWeek*, went out of its way to put the Apple spin-off in the worst possible light. Campbell in particular seemed to be singled out for harsh treatment.

LUIS DELGADO

Claris president Bill Campbell at company headquarters.

Meanwhile, Campbell's outspoken call for Apple to produce a low-cost Mac won him the enmity of more than a few managers at Apple. It was an ill-kept secret that by the beginning of 1989 relations between Apple and Claris had turned sour on many fronts, with Claris being denied access to new products and software that many other software developers had extensive access to. There was a certain irony to the situation that did not escape Claris executives: many small developers were openly displeased with the relationship and special privileges they believed Apple provided to Claris. Apple was going out of its way to disprove the idea. Meanwhile, during the preannouncement period, Claris product developers were forced to drive to Cupertino to use a Mac IIci for testing after their one week of in-house use had ended.

Understandably, the gregarious, outspoken executive became gun shy. But by last December, when I met with Campbell, the Apple rift appeared to have healed. Gone were perorations about Claris's expensive investigations into electronic-mail products that were subsequently abandoned after Apple announcements of strategic direction for Apple Mail. Instead, Claris has developed a reputation for being one of Apple's most capable developers for the features that system software 7.0 will provide. Jean-Louis Gassée has taken to performing demos with Claris products to show off the interapplication features of Apple's next-generation system software.

Some Things Never Change

Bill is smiling as he comes to the lobby of the building to greet me. After seven years of working at or around Apple, he's still happy. Must be genetic. While we walk to the cafeteria for lunch he works the crowd in a way that would

(continues)

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shame a Kennedy. As we move along the third-floor balcony, he spies people on other levels and shouts to them. Smiling, alluding to events, projects, or family members in ways that clearly show he communicates with employees on a regular basis. This is no egregious politicking, he takes pride in knowing Claris staff on a first-name basis.

The balustrades along the halls and stairwells have Plexiglas panels installed so that employees' children, who often visit, will not be able to crawl between the bars. A yellow plastic duck floats in the pool at the top of the fountain. The cafeteria, once the exclusive executive eatery of the former occupants of the building, is another source of pride. Campbell had the facility renovated and opened to all Claris employees. He exudes warmth and obviously enjoys his contact with staff.

Is It Really That Good?

As we sit to eat, Campbell grimaces when I tell him that I want to revisit Claris in this column. Explaining that he would prefer to B.S. about the industry rather than behave properly for an interview, he reminds me that he avoids publicity since he has been a target so often in the past.

I start by asking whatever happened to Claris CAD, the company's reportedly costly entry into the CAD market. Campbell responds that the investment was good, that Claris has a 38 percent share of the Mac CAD market. But he admits the market is a cupcake, not a pie—not the runaway market that some had anticipated.

I own up to the fact that I still prefer to use MacWrite 5.0 rather than MacWrite II. He notes that MacWrite II has received many extremely positive reviews, including those in *Macworld*.

I forget to ask, but think later of the fact that Deneba's Canvas is eating market share like crazy in the draw category—and at the expense of MacDraw, which remains one of the best-selling Mac programs all the same. I do remember to ask about MacPaint. It's clear that no one at Claris has much heart to talk about MacPaint. Its sales have dropped dramatically in the face of competition from Silicon Beach's SuperPaint, and Claris has made no

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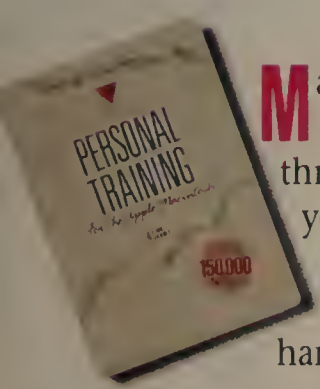

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statement of intent to upgrade the program. Instead, Claris employees have made it clear that MacDraw will continue to evolve and adopt features of MacPaint.

I could have asked, but didn't, about the forms market and SmartForms. It's undeniably a good product, with a major share of what's turned out to be another less-than-thriving market, though Claris ballyhooed it as the next wave in desktop publishing.

Can Claris Compete with Microsoft?

Above all else there is the question of whether Claris can grow to compete with Microsoft. MacProject and FileMaker are best-sellers (they sell around 2000 copies apiece per month) that, together with MacWrite and MacDraw (even better sellers), fill Claris's coffers and make the company a credible rival to Microsoft in the Mac software market. Microsoft derives over $100 million per year from its Mac software. So if you judge from this market alone, Claris and Aldus (which pulls in about $40 million in Mac sales) are Microsoft's only major competitors in the Mac market.

A related question is whether Claris will remain a Mac-only software company or whether it will decide it needs DOS- or Presentation Manager–based software in order to compete at the national level. One of Claris's stated goals at the time it was established was that the company would create software that exemplified the best that could be written for the Macintosh.

Actually, the company had a three-part scheme: update its existing software, acquire new products, and develop original products. No question about the updates—Claris has revised all of the original products twice in one year. Claris CAD, FileMaker, SmartForms, and part of MacWrite II are the acquisitions. The first two parts are completed. We should see in-house–developed applications by 1990. Hints of the work under way are available in the freeware program Public Folder that was distributed last October.

Public or Not?

One oft-asked question is when Claris will become a public company. The

(continues)

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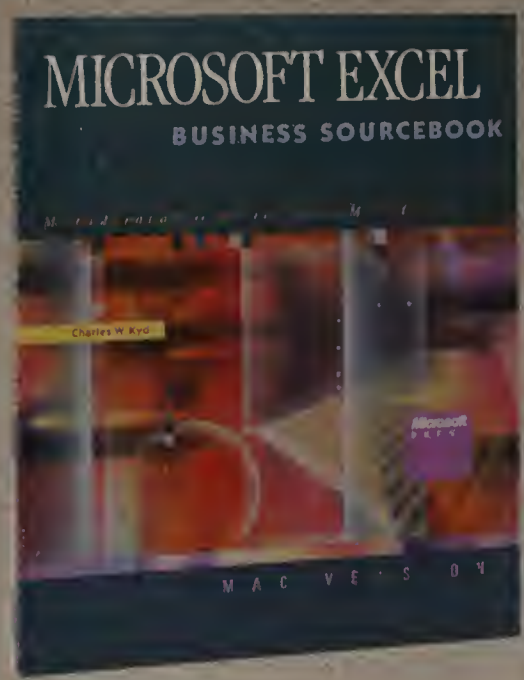

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answer will shape the two earlier questions and no doubt figures frequently in discussions at Apple. On this subject Campbell says only that going public is a decision that John Sculley and Al Eisenstat will have to make. I don't really expect we can imagine how Claris will look in the future until it is completely in control of its own destiny. And I don't expect to see a definitive answer to the DOS Presentation Manager development question until then either. There is no obvious need for Claris to go public or for Apple to raise capital by organizing an IPO (initial public offering). In fact, the argument could be made that Claris is a candidate for a leveraged buyout by its employees and so would remain private. At present Apple has too much at stake to allow Claris that kind of freedom.

The company's unusually large expenditures for research and development would be curtailed by such a public offering. And since Claris is now working furiously to take advantage of 7.0 features, it has little incentive to subject itself to public scrutiny. Third parties, on the other hand, would love to see Claris subject to the vagaries of the stock exchange.

One can argue that Claris is better positioned than Microsoft or Aldus to have a broad range of products based on 7.0. In fact, one could say at this juncture that Claris's success with 7.0 will be the harbinger for the overall success of Apple's latest version of its operating system.

Still Part of Apple?

Beyond questions of technology and business there is the issue of whether Claris has the heart, the identity, to become a company in its own right. Or whether it will become mired in attempts to clone Apple's mentality.

"The duck—so that's where it's gone," said a friend upon hearing about the artificial waterfowl floating three stories high in its cement pond. And slowly I recalled that the duck had floated for some years in the blue-tiled ponds of Apple's former corporate headquarters. That seemed a fitting symbol of Claris. Part of Apple—perhaps some of the best parts—went to Claris. But the rest is a new story made up as it goes along. ◻

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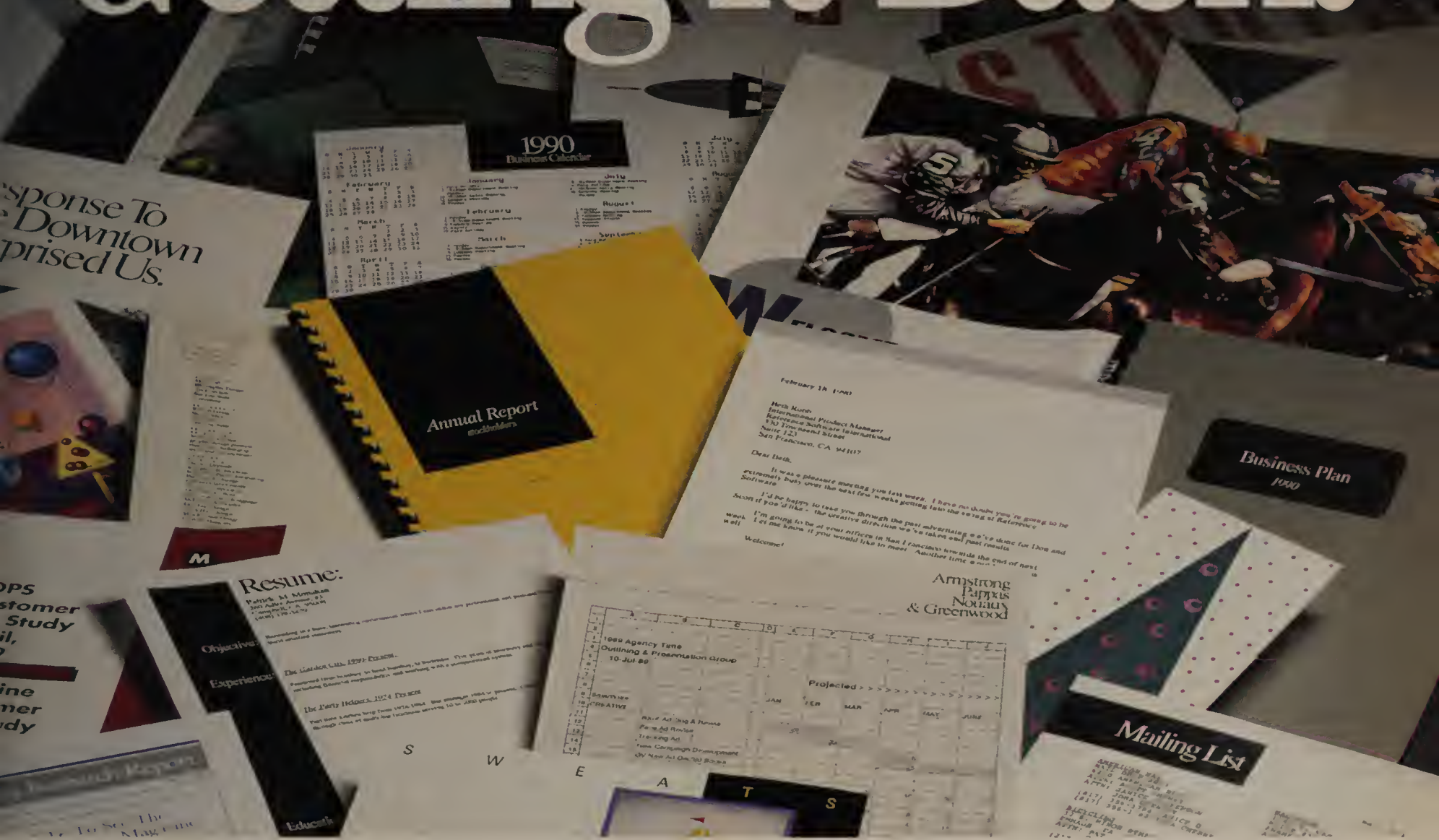

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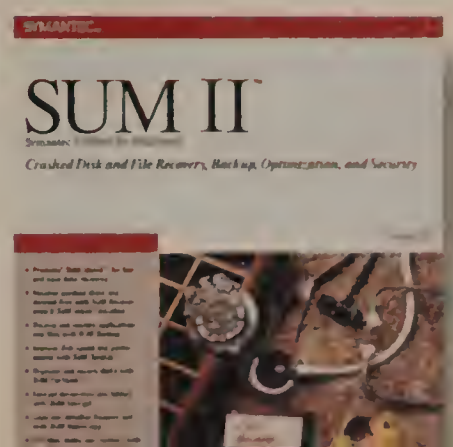

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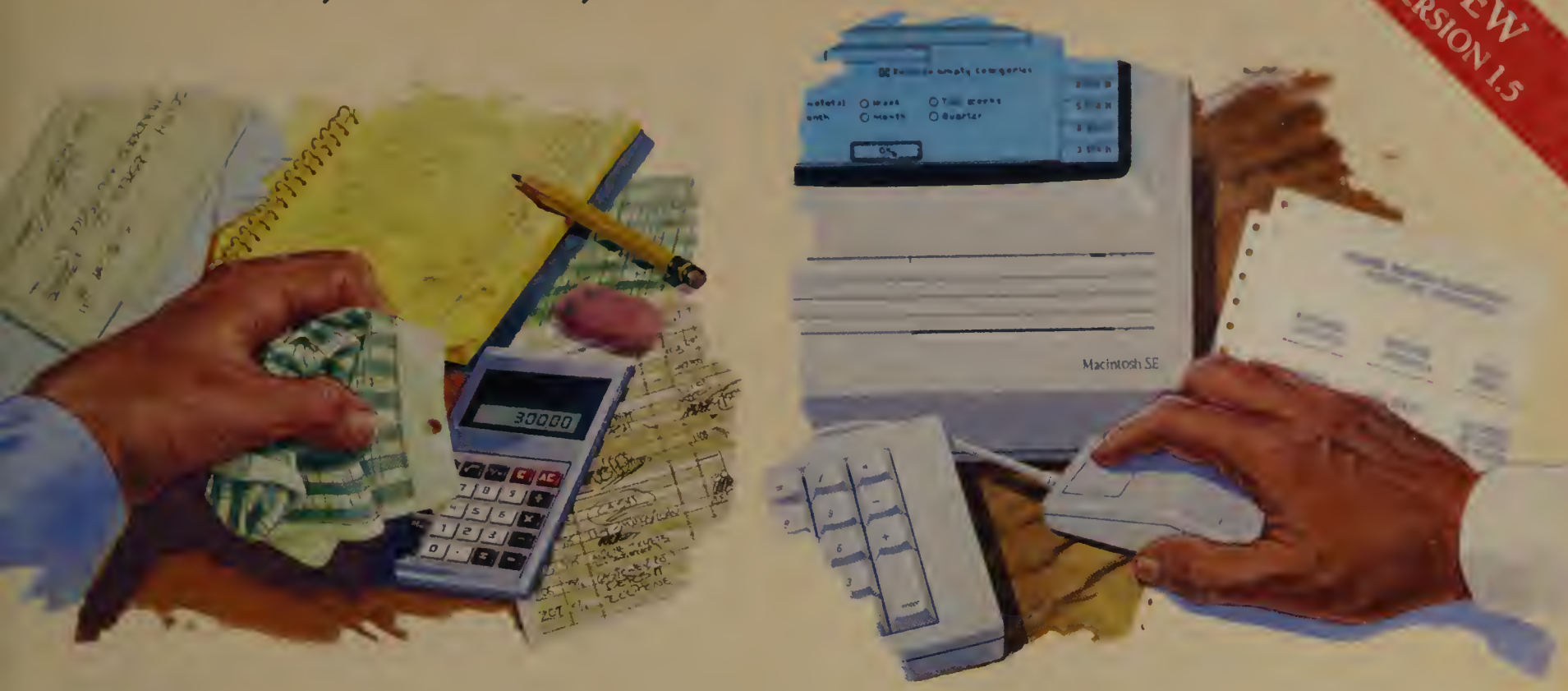

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LETTERS

A forum for Macworld readers

STEVE LYONS

The Warranty Shuffle

I bought a Mac IIx in February, and by the end of July my hard disk icon would not show up on the desktop. Even though I thought it would be a waste of time, I decided to write to Mr. Scully. After three weeks and a couple of letters, I was surprised to receive complimentary 12-month AppleCare coverage.

Apple was not ready to admit that a three-month warranty period is inadequate; a whole page of the first reply I received was devoted to explaining how perfect Apple products are. What I found interesting was the care taken to avoid admitting that my complaints about the short warranty period might be justified. Instead, I was assured that Apple was doing me a favor because I was "a valued customer."

If enough individuals wrote to Apple, they could not be ignored. A flood of letters might do what trade journal commentaries have not accomplished.

Silvia Ator
Willington, Connecticut

It Starts Making Sense

I'm glad to see your efforts to push Apple to extend its warranty to more than 90 days. But given the current state of Apple products, I'm not sure that's necessary for its whole product line.

Last summer I had *two* Apple internal hard disks go bad; both failed within 90 days. Perhaps Apple is making its puny warranty seem more useful by selling such shoddy hardware that the warranty actually comes in handy.

Mike Morton
Honolulu, Hawaii

The Pricey Portable

I enjoyed your *Commentary*, "Will You Buy This Portable?" (November 1989). But one correction needs to be made: the Toshiba T1200 has an 80C86, not a 286 microprocessor.

Anyway, I agree with you that the Macintosh Portable is a good tradeoff. And in some professions (journalism, for example), the cost can be justified. But for most folks, $6500 is out of the question. Another good tradeoff—and probably a better value—is to get one of the MS-DOS laptops and MacLink Plus.

Camp Peary
Computer Attic
Palo Alto, California

Corrections

*The phone number for Mitem, maker of MitemView (*New Products, *January 1990) is 408/559-8801.*

*The phone number for SuperMac Technical Support (*Conspicuous Consumer, *January 1990) is 408/245-0646. Online access to tech support is available via GEnie, Connect, and AppleLink.*

*The telephone number for TOPS customer service (*Conspicuous Consumer, *January 1990) is 415/769-8808.*

*The phone number for Invention Software, maker of Object GrafPak (*Where to Buy, *January 1990), is 313/996-8108.*

*The phone number for WordPerfect technical support (*Conspicuous Consumer, *January 1990) is 800/336-3614.*

Time for a New NuBus

When the Mac II was introduced, in came the problem of the NuBus: that NuBus cycles are more than a tad slower than the 16-MHz 68020 chip. This was not truly apparent until the faster 16MHz 68030 was introduced with true 32-bit addressing, about the time that more NuBus boards were being made available. You can't put any high-speed device or memory in the NuBus.

(continues)

We have a 25MHz 68030 that still depends on that aged NuBus. It's like walking with gum on your shoe. What could be the reason for this oversight? Cost? No. Anyone willing to shell out for 80-nanosecond chips won't blink twice at spending a few more dollars.
Michael F. Sanders
Address unknown

ProDOS Read/Write

On page 217 of the October issue, in *New Products*, you mention again that Apple's new FDHD floppy drive [now called the SuperDrive] can read, write, and format 800K ProDOS disks. It's important to remind readers that of these three ProDOS capabilities, only the ability to format is new. Regular 800K floppy drives have always been able to read and write files on preformatted ProDOS disks using Apple File Exchange. The fact that you and other sources keep mentioning the FDHD's ProDOS read-and-write capability makes it seem like a new feature for Mac floppy drives when it's not.
Martin B. Tittle
Ann Arbor, Michigan

A Printer's Life Cycle

I found Jim Heid's article "Paging All Printers," in your October 1989 issue, most informative, especially since I am in the market for a laser printer for home use. However, I think Heid overlooked one point in his analysis: life-cycle costs.

I use the NEC LC890 Silentwriter with my Mac II (on a five-Mac network) at work. We chose the Silentwriter because its engine's rated life was 600,000 pages. Heid's chart, "Printer Particulars," shows that the Silentwriter is the only moderately priced printer with a 600,000-page engine life; the others in its price range have ratings of either 180,000 or 300,000 pages. The only other printers that have a 600,000-page rating are the Dataproducts LZR-1260 ($7995) and the Agfa Compugraphics P3400PS ($12,500).
Chris E. Hagberg
Vienna, Virginia

Engine life-cycle ratings are less important than such engine specifications as paper capacity, pages per minute, and cost of consumable components such as toner. If you print 100 pages every business day, even a lowly 180,000-page engine will run for seven years before needing an overhaul. Chances are you'll be ready to upgrade to a faster, newer printer by then.—Ed.

Printer Problems

In your recent review of laser printers (October 1989), you recommended the GCC Personal LaserPrinter, noting that it is prone to only occasional incompatibility problems. My experiences with one of these printers leads me to believe otherwise.

First, I found that certain lines in Word 4.0 (including fraction bars) print as hairlines. This means I can't use Word 4.0 to produce mathematical documents. Second, when I used the software upgrade I received from GCC, I discovered that printing from Word 3.02 often resulted in compressed blank characters and extra space inserted between nonblank charac-
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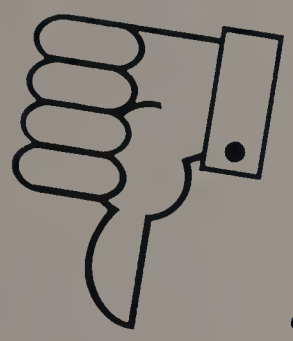
The Scientific & Technical Information Network

Circle 147 on reader service card.

Read It And Reap.

Memo To: Mac people who would like to write better
From: Ken Dickens, ad writer
Re: A great new product, a helpful book, and a contest to get both *FREE*

I'm a skeptic. So when the people at Reference Software told me Grammatik Mac could improve my writing, I said, "Right." Faster, fontier, or even bolder I could believe, but better? Give me a break. I thought, if it was real good, it might help business people write better letters or memos.



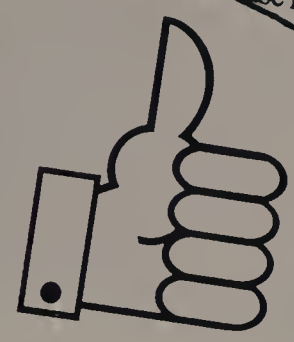
Then again, I do this for a living (not a bad one I might add). So if software can improve my writing, it's fantastic. And I'm not.

Well, two weeks and a whole lot of humble pie later, I'm here to tell you that Grammatik Mac is nothing like those desk accessory style checkers you might have tried. Believe me, it's like an English professor in a box. The thing actually proofreads each sentence and breaks it down into parts of speach. It's scary, remember sentence diagramming? Well, that's basically what it does right on your screen.

I guess that's how it knows if subjects and verbs are in agreement. Prepositions are dangling. Plurals should be possessive. All that stuff I can never remember and have to look up. For example, Grammatik might stop on a sentence like "I feel I should have won the Grammatik Mac Contest, its a real shame", tell you that "feel" is probably incorrect, suggest "think" instead and by the way, "its" should be "it's ." You can ignore the suggestion and move on (which is what I usually do, making the excuse that it's my writing style) or change the offending phrase right then and there. I like that. It lets me fix my mistakes without cramping my style.

Grammatik Mac catches errors like incomplete sentences, improper use of homonyms (like "their" instead of "there"), split infinitives, noun/modifier disagreements, passive voice, and etc. It even flags unbalanced punctuation, transpositions (like form instead of from, capitalization errors, and thousands of others I've never even heard of.

So, what's it done for me? Nothing short of making my writing better. And the more I use it, the fewer mistakes it catches (could I be learning something here?). Anyway, I'm happy to report that I almost never write in passive voice, that I've solved my its/it's problem, yet I still split lots of infinitives. And I always start too many sentences with and. . . but, that's just my style.



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Ken Dickens

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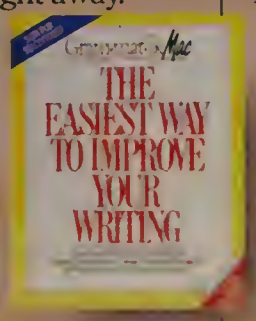

☐ *Here's my contest entry, please send me Secrets Of Successful Writing FREE ($9.95 value).*

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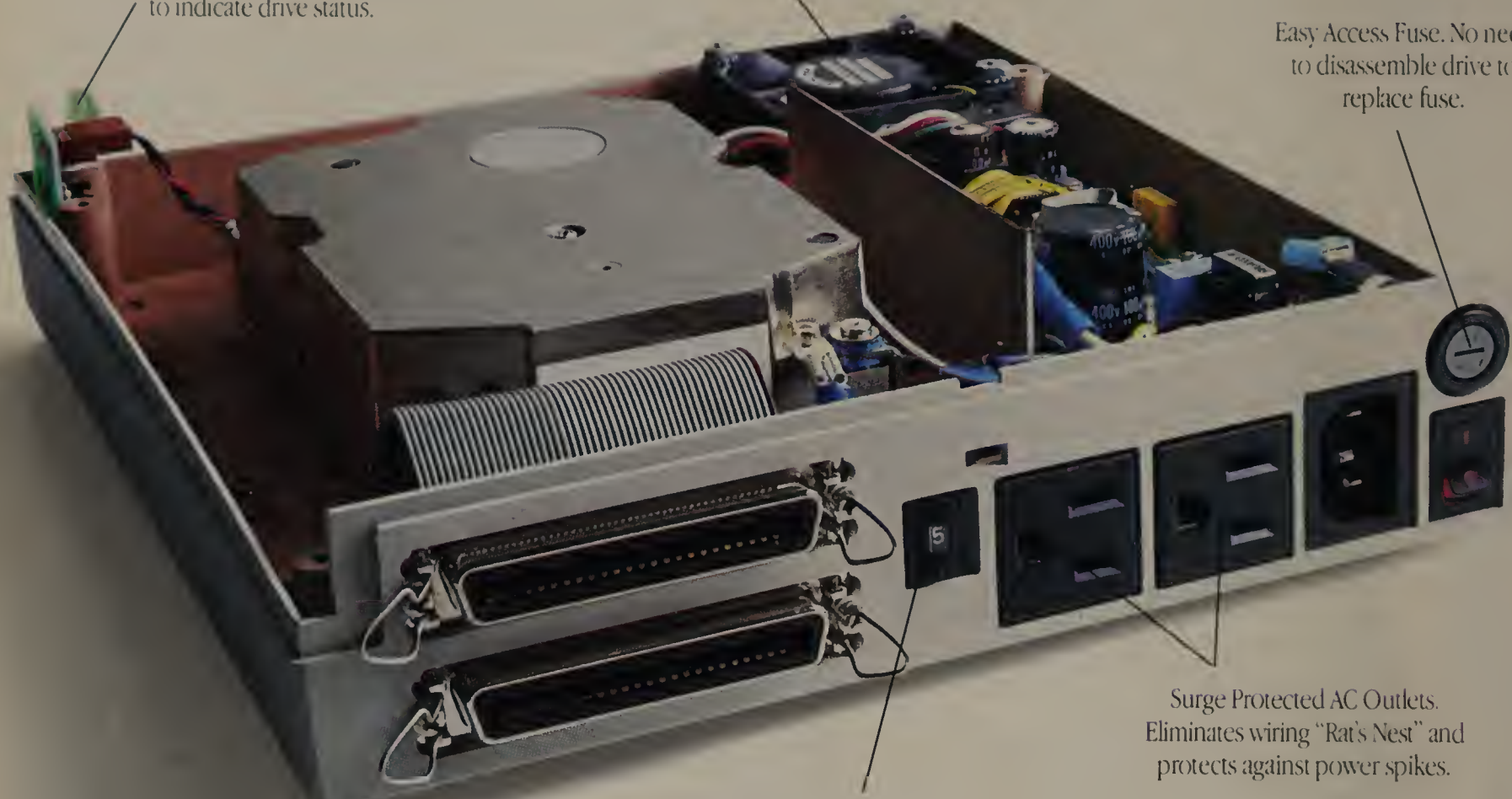

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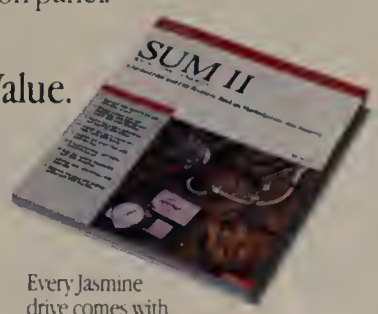

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Circle 125 on reader service card

ters. This is unacceptable for any kind of printing. Finally, almost everything I print from Expressionist, a well-known equation editor, looks terrible on the GCC PLP.

Evidently, most manufacturers test their software on PostScript printers and ignore the PLP (none of the companies I contacted had a PLP for testing purposes). The fact that GCC would distribute software for its own printer that does not work properly with a major application like Word 3.02 says something about the quality of the product.

None of these problems occur on Apple laser printers. Hindsight is always 20/20, but if I had it to do over again, I would certainly spend the extra money for an Apple laser printer. I suggest you give a stronger warning to potential purchasers of non-PostScript printers. The inability to correctly print the documents you create makes your entire computer system rather worthless and all your efforts creating these documents a waste of time.

Michael R. Ziegler
Fox Point, Wisconsin

Your experiences prove that QuickDraw printers remain second-class citizens in the laser printer world. We expect more software firms to test their products with QuickDraw printers when System 7.0 makes them better alternatives to PostScript printers. Until then, people who are contemplating buying a QuickDraw laser printer should make sure it's been tested with their favorite applications.—Ed.

Virus Prevention

We found Bruce Webster's comparison of antiviral programs (*Reviews*, January 1990) extremely misleading. A major source of confusion is his failure to distinguish between Class I, Prevention, and Class II, Detection, categories of antiviral products.

Anti-Virus Kit is a Class I utility—it stops viral replication, thereby preventing infection. Using a Class II test (scanning for infected files) Webster reports that Anti-Virus Kit doesn't detect Scores and nVir. Had he performed a Class I test (running an application infected with Scores or nVir) he would have found that Anti-Virus Kit detected the virus, blocked its actions, and even allowed the application to be used without infecting other files.

Ironically, Webster complains about the costly upgrade "treadmill" but misses the point that Class II products require upgrades to detect new viruses. Because Anti-Virus Kit does not detect specific viruses, upgrades are unnecessary. Anti-Virus Kit provides extremely effective viral protection. Since its release, at least six new viruses have appeared. In all cases the original version blocks their actions.

Susan Monjan
1st Aid Software
Boston, Massachusetts

Anti-Virus Kit (AVK) does make claims for Class II functionality, both on the packaging ("a . . . set of utilities for detecting and preventing viral infections") and on page 21 of the manual, which discusses using the Inoculator utility to examine applications "for evidence of viral infection [by searching for] structural tampering characteristic of all viruses"). All the packages we tested offer general protection and prevention; two of them received a comparable score in protection (Class I) and a far superior

(continues)

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score in detection (Class II)—both for the same price of AVK. If you use a product that does not offer sufficient detection of existing viruses, you may unwittingly pass along infected files that have not yet been executed. Consequently, antiviral programs should have both detection and prevention capabilities.—Ed.

The Upside of Finance

Steven Levy is a funny and talented fellow (*The Iconoclast,* January 1990). He is to personal-finance software what Fran Lebowitz is to exercise and fresh air (she hates them). On my second reading of his column about Managing Your Money, I saw there were actually quite a few kudos, plus a clear statement that "my personal rejection of [Managing Your Money] does not imply that others should reject it." Still, on first reading, the column is devastating.

He says "it didn't take long to realize that whatever bias [Tobias] had against the Macintosh is subtly reflected [in MYM]." Sounds sinister, no? Actually, Mac-MYM was designed and programmed by a team of Mac true-believers, not me.

He talks of a "quasi-tyranny" that underlies the program. You "must go through your house room by room, gauging what all your furniture is worth." Nonsense. You can do that or not, as you please—MYM offers tremendous flexibility in how you organize your finances and then lets you click and drag to rearrange your groupings and subgroupings and watch all the subtotals and pie charts change.

"You don't simply open a file called New when you want to start over; a complicated rigmarole is invoked." To make a new data file, just select New from the File menu—as with any other Mac program. I guess the "complicated rigmarole" is the dialog box we then throw up on the screen suggesting you not use a totally blank new file, but rather choose one of the empty but prestructured files we supply (one business, one personal) to save you a lot of grunt work. Why is that complicated?

"Other features are downright depressing." OK, his tongue is in his cheek—but it's not the most upbeat way to describe features none of the competition has in anywhere near MYM's depth, if at all: insurance planning, retirement planning, college-tuition planning, and portfolio analysis (among others).

Why would someone go to the trouble of entering his or her financial transactions into the Macintosh (it's really less trouble than manual bill-paying and tax-record organizing, once you get the hang of it) and then not take a little extra time to get a lot more out of it?

I hope Steven Levy's column—amusing though it was—won't be *Macworld*'s last word on the subject.

Andrew Tobias
via CompuServe

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Letters should be mailed to *Letters, Macworld,* 501 Second St., San Francisco, CA 94107, or sent electronically via CompuServe (70370,702) or MCI Mail (294-8078). Include a return address. We regret that, due to the high volume of mail received, we're unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld.*

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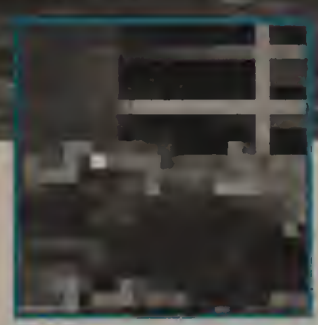

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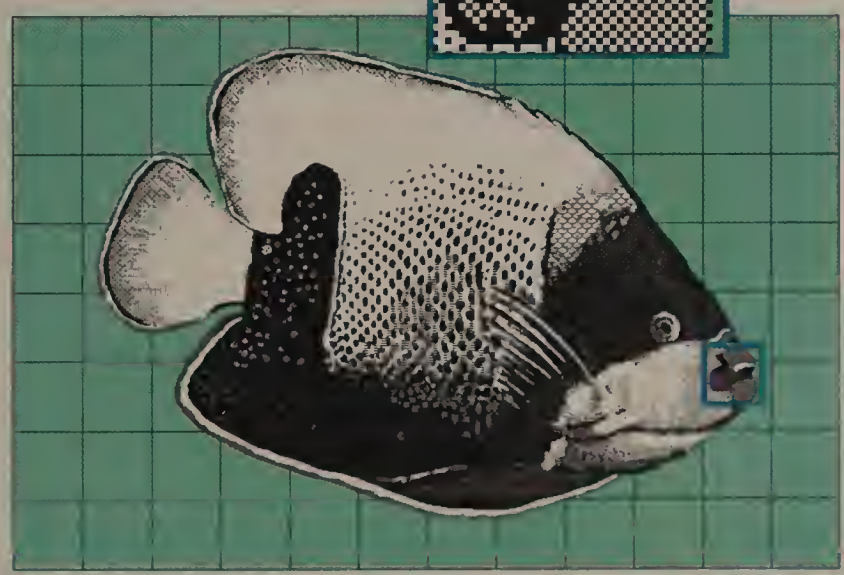

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ART BEAT

by Deborah Branscum

This column examines the tools and the talent behind Macworld's graphics and discusses the techniques that make them possible.

Artist: Veteran *Macworld* illustrator Mick Wiggins finds his work in demand at several national publications. Two years ago the Berkeley, California–based artist switched to exclusively using the Mac for his commercial work.

Tools: Mac II, external 30MB DataFrame hard disk from SuperMac, BarneyScan scanner, Adobe PhotoShop, PixelPaint Professional.

How It Was Done: Wiggins was asked to create an illustration for "Color Paint Revisited" on page 144. As the article points out, the advent of 32-bit QuickDraw and 24-bit color boards make the Mac a truly professional color tool. To highlight that concept, Wiggins's illustration couples computer references (an outline of a Mac, a mouse) with allusions to old masterpieces and contemporary art.

After sketching a rough of the illustration, Wiggins tracked down images to use as "scrap" for his creation. The artist used a service bureau's BarneyScan to scan in several transparencies for his exercise in computer collage. Once he had stored the images on the external hard disk, he headed home for a session with PhotoShop to clean them up. Wiggins spent some three hours sharpening colors, tilting images, and working other voodoo to create the best images.

"I'm real impressed with PhotoShop," says Wiggins. The picture frame appeared brown and murky after being photographed from a magazine and scanned. The artist experimented with frame sizes and fine-tuned the final choice in PhotoShop for a brighter gold.

Once he was satisfied with the scanned images, Wiggins moved to PixelPaint Pro. The ratio of photos to drawings was important to Wiggins, who used PixelPaint Pro for the individually drawn elements and overall illustration, which was 1.3MB when completed.

"It's new for me to have four-color photographs in an illustration and to work out linear elements and illustrations so they balance," says Wiggins. "It took me a day to get used to working with photo images," but the overall illustration was no more time-consuming than usual. □

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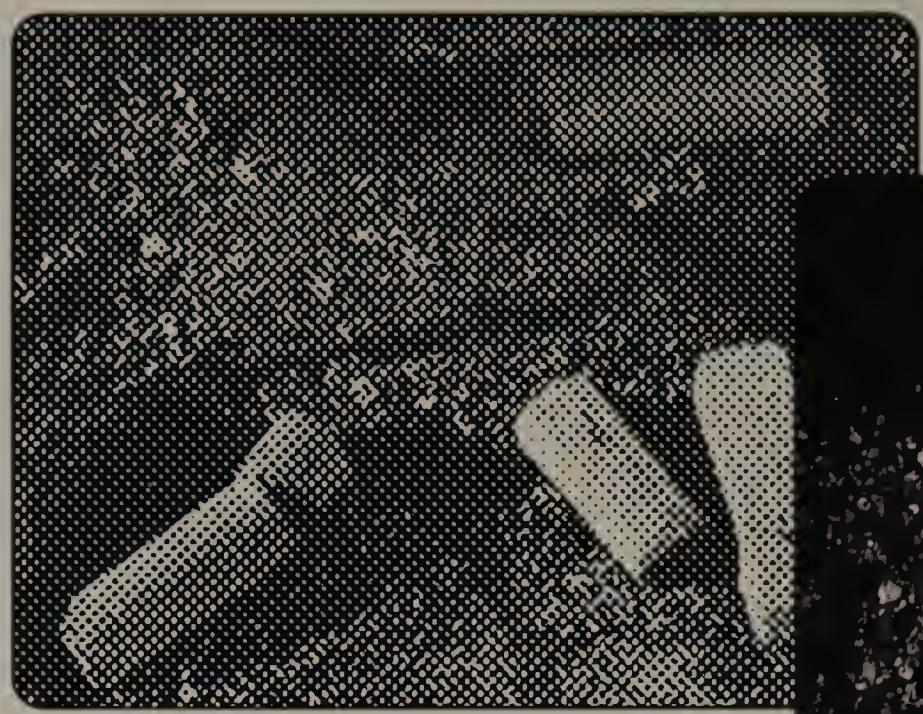

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The Not-So-Great Compromise

THE MACINTOSH PORTABLE IS NOT THE BEST, JUST THE MOST BEARABLE

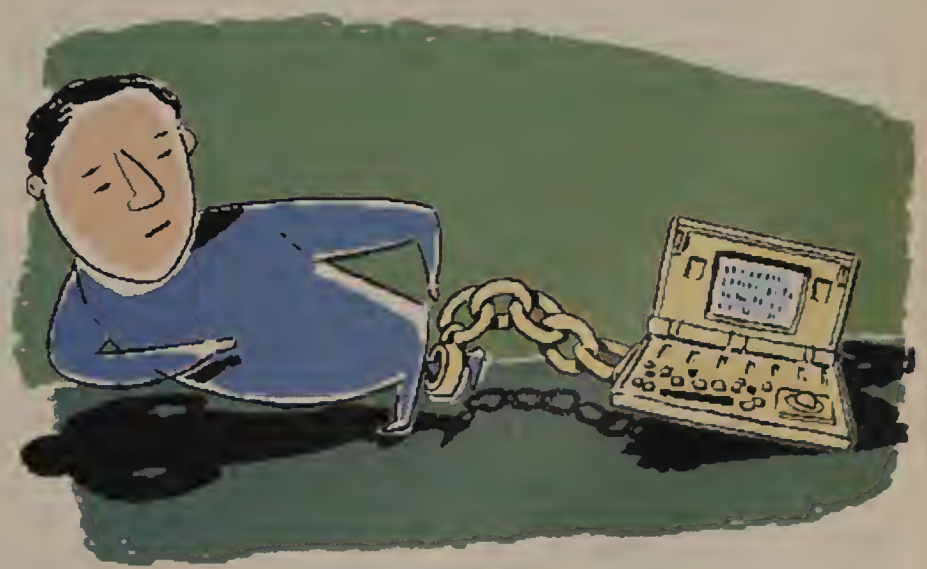
BY STEVEN LEVY

The Macintosh Portable is, in my opinion, the least successful computer that Apple has shipped since pre-Mac days. For all the baloney we've been fed about its being a no-compromise machine, it is full of compromises: its size is a compromise, its weight is a compromise, its processing chip is a compromise, its scheme for memory additions is a compromise, and its lack of a backlit screen is a compromise. The one place where it does not compromise is in what we can call its Macintoshness: rather gloriously, it behaves just like your Mac at home. But this does not begin to compensate for its glaring shortcomings.

There are plenty of bones to pick with this computer—turkeys are loaded with bones—but most of them organically stem from the Portable's design philosophy. Basically, there are two ways to go when designing a portable computer. You can assume that people will use it on the run (like all those apocryphal executives spreadsheeting away in Business Class), in which case your goals are to try to squeeze out the most from your batteries and to make the thing small enough so people can whip it out of a briefcase on a moment's notice. Or you can target it to people who want to move the computer easily from one place to another, but will actually use it in places where electrical plugs are within reach. Once you're socked into the nation's electrical umbilical, you needn't worry about squeezing every last drop of power from the batteries, and you don't have to design low-power custom components that drive the cost up.

Assault and Battery

Apple chose the former path and obviously spent oodles of time and money devising clever ways to conserve power. The circuitry is low-power CMOS (Complementary Metal-Oxide Semiconductor), the hard disk drive keeps shutting itself off, and the RAM chips are incredibly costly static versions. The happy result is that users trekking into the Mojave Desert, or the few other places in this country where a power outlet is not within a dozen feet, can use Wingz, FullWrite Professional, and 4th Dimension for as much as eight hours (according to Apple) before breaking camp to recharge the batteries. Unhappily, Apple did not fulfill the second, and most important, requirement of battery-powered machines—size. In order to do your computing in remote locations, you want a machine light enough to accompany you on a whim and compact enough to *use* in those locations. Considerably bigger than a breadbox and weighing in at a satanic 16 pounds, the Portable is too big and too heavy. Its battery, for heaven's sake, is lead-acid based—practically a car battery! Its avoirdupois makes it impractical for desert treks, its size overwhelms the average beach bag, and its bulk makes it too awkward for comfortable airplane use. (I figure its best airborne function is as a deadly weapon dropped from a bomb hatch.) Ultimately, it doesn't matter what Apple did to maximize battery use because the Portable is too much of a monster to be used anywhere else than inside, on a desk or table, where it's easy to plug it into the wall.



WARD SCHUMAKER

Once you do plug it into the wall, you begin paying a performance price for all those little battery-saving tricks

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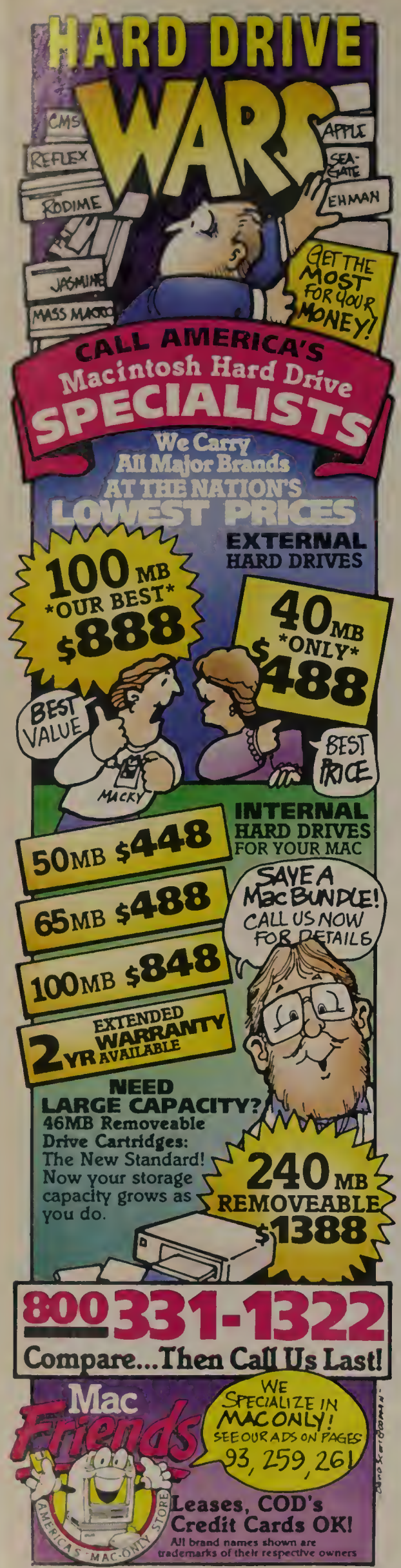

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that Apple misguidedly stuffed into the Portable. Remember I mentioned an ensemble of classic Macintosh software applications one might install on the Portable's hard drive? Well, Wingz, FullWrite, and 4th Dimension are best used on state-of-the-art Macintoshes with more powerful processors than the 68000 found on the Mac Plus or standard SE. The Portable uses a low-power CMOS 68000 version that runs twice as fast as the chip on the SE—but slower than the SE/30 or the IIcx. (Apple's excuse is that the mighty 68030 chip isn't available in a CMOS version.) Since extra RAM must also be purchased in extravagantly priced static versions, an extra megabyte of memory will cost you well over a thousand bucks. And right now, 2MB of memory is the most you can carry, not enough for power computing (so forget about System 7.0). In some respects, Apple's most expensive computer—this baby costs around $6500—is its wimpiest.

Let me give another example: the hard disk. Apple has arranged it so that if the hard disk isn't accessed for a while, it shuts itself off. When you invoke an event that requires accessing the hard disk, it turns itself back on—and you lose a few seconds while things get going. In this mode, the Macintosh Portable is like Ronald Reagan at a cabinet meeting, dozing off every few minutes and awakening with a start when addressed directly. Most people will find this feature annoying and take the trouble to turn if off via the Control Panel because they'll be using the Portable plugged into the wall.

And then there is the display, an active-matrix LCD—superior to a standard LCD but not superior to a backlit screen, which allows for best contrast and does not require a strong separate light source to reflect off the panel. Why isn't the screen backlit? Battery conservation. Of course, when you're plugged into the wall, you don't care about energy conservation—but you suffer from the compromise.

Now certainly there are times, one might argue, that all this conservation might be essential. What about the recent earthquake in San Francisco, for instance, when the newspapers, stung by the power outage, tried to put out their next-day editions with Macintosh technology? Well, as it happened, I dropped in to the *San Francisco Examiner* a few hours after the earth moved and indeed found portables in evidence in the darkened newsroom. But they were MS-DOS portables with backlit screens—the reflective LCD Apple Portables would have been useless.

On the Road

Hey, I *tried* to use the Portable on the road. I even took it to a public seminar, intending to use it to take notes. At first, things seemed promising. People who hadn't seen the computer before crowded around, admiring the distinctive Mac desktop on an LCD screen. Then the meeting started, and I had a few problems. The noise from the standard Mac keyboard made my typing rather distinctive, and the liberal use of beeps common to Mac applications drew some critical stares. (I sheepishly used the Control Panel to turn off the sound.)

That done, everything went swimmingly for a while. I was having a great time using the familiar Microsoft Word to take notes on the fly, editing them, and adding thoughts as some of the speeches from the podium hit dull spots. I was getting increasingly fond of the nifty trackball. But after 10 minutes or so, my legs, which had been propping up the machine, began to feel constricted. And my arms got tired, typing from an awkward elbows-askew position because the keyboard was up against my belt buckle. (Otherwise the Macintosh Portable would have slid ingloriously to the floor.) I tried another position, crossing my right ankle over my left leg for a new ad hoc desktop. It took only 5 minutes for the weight to bother me. After about 20 minutes of shifting positions, crossing and recrossing my legs, and readjusting the computer on my lap, I put the beast back into the padded carrying case that Apple generously provides Portable users. It was back to pen and steno pad.

If Not the Portable, What?

I hope I have made it clear that Macintosh users who need something more portable than their current models might not find the Portable the godsend that Apple has promoted it to be.

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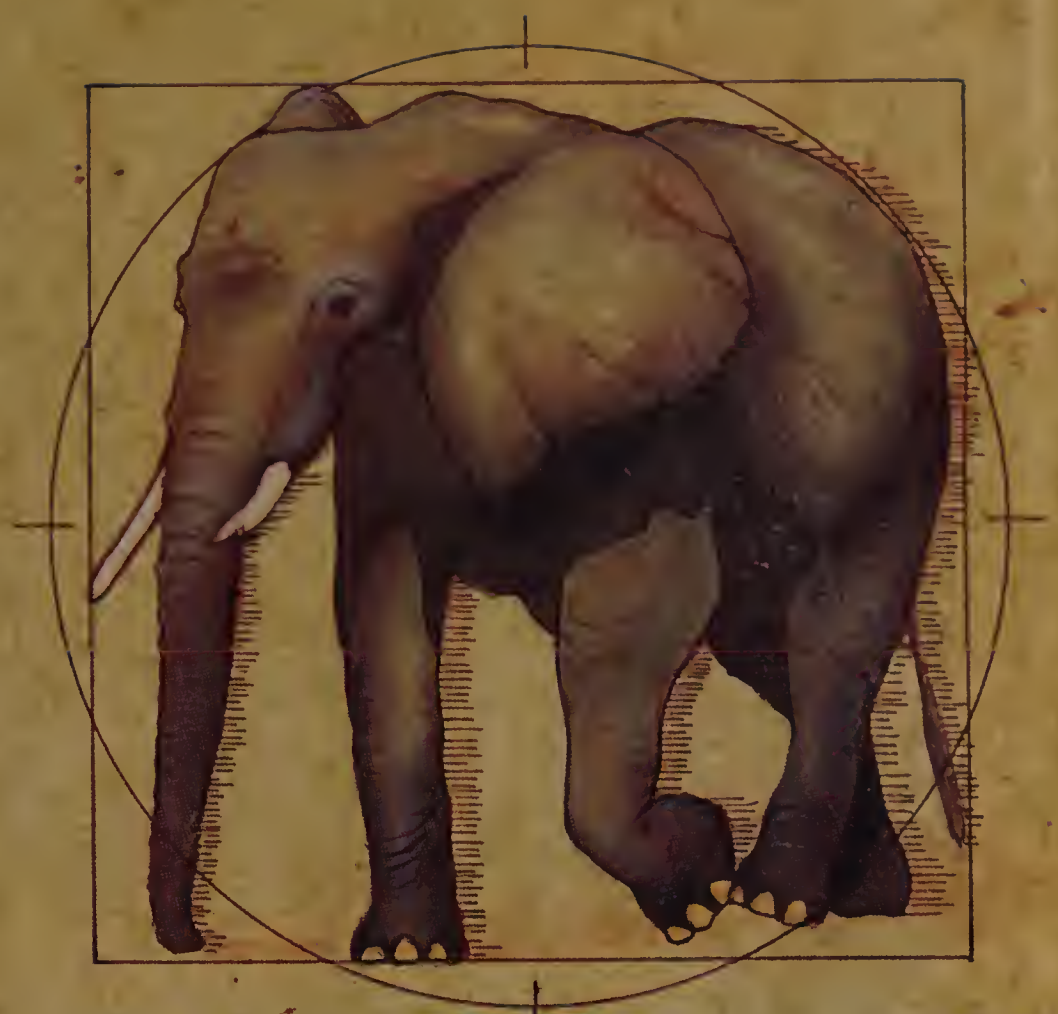

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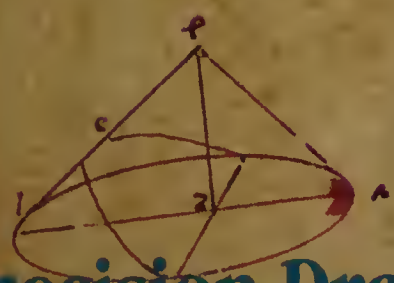

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PART IV SOLUTIONS

Industry Challenged To Take Role In Education

As we have seen, the inadequacy of the U.S. labor force is reaching crisis proportions. The average literacy level of today's young adults is below the average level needed by the job market. In the next ten years, the job market will demand an even higher level of proficiency in reading and math. Many young adults with only a high school diploma or worse, will effectively be shut out from the job market as demand for unskilled, manual labor jobs decreases. This ever growing segment of the population will become a drag on the economy due to increased unemployment.

Corporations can ill afford not to try and remedy this situation. For if they do not, they will not have a satisfactory pool of job applicants from which to choose the workers to fill the positions which will develop in the next several years. The jobs will have to be filled by unqualified, undereducated workers. This will create lower productivity and thus a lower standard of living across the board. This, of course, has worldwide implications as well, adversely affecting U.S.

Sponsor curriculum development

As corporations assess key skills required over the next several decades, they should cooperate with high schools and junior high schools to develop programs that breed interest and proficiency in these areas. Corporations can even sponsor extracurricular activities such as science, computer or speech clubs that would reproduce real-life situations. Exposure, experience and excitement about the field can grow together.

Reward those who graduate

Corporations can offer guaranteed part-time employment to students who agree to remain in school and pursue courses preparing them for careers in their chosen field. Students perceive an incentive to stay in school and to experience a variety of disciplines.

Support employee involvement in school activities

Corporations should encourage executives to spend time with students in the classroom. The man-hours lost would be repaid many times over. For students, school becomes a more interesting environment with clear attachments to the outside world. At the same time, the company builds a close relationship with young people with roots

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But what are the alternatives? After returning the demo Portable to Apple (my one regret at not using it longer is that by lugging it around I would have had a chance to bulk up à la Schwarzenegger), I explored the other paths to portable computing available to Macintosh users.

My previous solution to the problem—the one I'd used while waiting for Apple to ship a real portable—was a cheap Radio Shack Model 100. I used it to record notes while traveling and to jot down things when doing library research. It had no disk drive of any sort, but I could use the built-in modem to send back files at the end of the day. Or I'd wait until I got home and use my ImageWriter cable to get files directly into the Mac. The word processor was barely more than a line editor, the screen was microscopic and barely readable, but the Model 100 did the job. A snazzier version of this style of laptopping is available with the Sinclair, which has more memory and silent keys.

I figured that a better alternative to this minimal degree of computational power would be found with some of the hot MS-DOS laptops that have come out in the past year or two. These seemed to be universally lower cost and more compact than the Portable. Why not use them on the road, and later transfer data back to the Mac with software designed for that purpose? Certainly the inconvenience of using the other style of computing couldn't overwhelm the advantages in price and portability you'd get by using something from Toshiba, Compaq, or NEC.

Gimme a Lite

I decided to test the latter. When I got the NEC UltraLite out of the box, my first thought was, Why couldn't Apple have used this as its model? The UltraLite is barely larger than a piece of business stationery and not more than an inch thick. It weighs all of 4 1/4 pounds, and when you lift the cover you get a full-size keyboard and a legible backlit display about the size of an SE's screen. There are no disk drives, but there is a 1- or 2MB internal silicon drive that acts as a virtual hard disk; you can also purchase credit-card-size silicon disks to store information or load applications. There's a built-in 2400-baud modem, too. And NEC includes a program called LapLink, but you'll want the Mac version that allows your UltraLite to convert its files directly to your Mac software programs. Its cost is bearable: I've seen it advertised for well under $2000. What's the main compromise? Battery use. The UltraLite gives you only two hours on a full charge, and if you don't recharge the computer at least every week, you can lose the internal data. (By contrast, the Macintosh Portable worries like a Jewish mother over those things and is full of warnings and fail-safe systems.)

After ten minutes or so, my legs began to feel constricted and my arms got tired

Still, this is a compromise one can live with. Unfortunately, I quickly discovered something I couldn't live with: MS-DOS itself. After five years of Macintosh computing, I could not bring myself to deal with balancing four kinds of disk drives named after letters or typing arcane codes to copy files. Just setting up the system was torture: I felt like a bureaucrat in that Kafkaesque movie *Brazil*. Then I popped in the ROM card for a word processor named XyWrite and almost had a coronary. Yes, it's a full-featured word processor. But to someone schooled in MacWrite, Microsoft Word, and Nisus, the very idea of moving the cursor to define the beginning and end of text blocks seemed like slow death.

This issue is no small one. The main reason I use Macintosh is that I thrive on the environment: it treats me like a human being. The UltraLite is a magnificent piece of machinery, much more sensibly conceived than the Macintosh Portable; but it uses MS-DOS, and I don't want to live there. However, I realize that there are plenty of Macintosh users who for professional reasons must maintain a familiarity with the style of computing used by the vast majority of personal computer users. And they would indeed find the UltraLite or any other number of MS-DOS laptops a superior alternative to the Portable.

How about the non-Apple portables that run like Macintoshes? I was excited to see a prototype of something called the Wallaby last August at the Macworld Expo, but at press time it wasn't available, so I cannot yet recommend it. Then there is the Colby Systems Walkmac. Though somewhat more compact than the Portable, it's nearly as expensive, and not as cleverly designed (the mouse port is on the left, giving us righties a taste of discrimination). Also at 12 pounds (15 pounds with the battery), it's almost as much a briefcase buster as the Portable. When will people understand a terrific *trans*-portable computer already exists at half the price of these faux portables—the Apple Mac SE/30?

I can't really fault Colby—like any other company trying to compete with Apple in the portable market, Colby has an insurmountable disadvantage in not having license to duplicate the operating system that makes Macintoshes Macintosh. Colby literally has to buy an SE and repackage it into a portable, an approach that would be doomed if Apple ever decided to price the Portable reasonably.

The bottom line is this: though the Portable is foolishly conceived and seriously overpriced, there's not much in the way of alternatives. Unlike in the hotly competitive MS-DOS world, there is a monopoly in the Macintosh universe. Any dreams of 4 1/4 pound Macs with backlit screens costing $2000 will come true only at Apple's sufferance. I'm sure Apple didn't plan to deliver a computer as disappointing as the Macintosh Portable, but complacency might have had something to do with it. As for the pricing, one can only call it gall.

As Macintosh users, we are prisoners of Apple Computer. And the Portable is our ball and chain. ◻

Steven Levy is a Macworld *columnist and the author of* The Unicorn's Secret: Murder in the Age of Aquarius *(NAL, 1989).*

RAGED CUSTOMER SEIZES ALIEN FLYING DISK AND BEATS COMPUTER SALESMAN SENSELESS.

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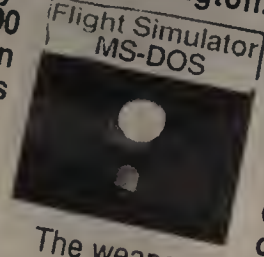

The weapon

Police were called to break up the scuffle, but Brian Girvins, Manager, declined to press charges: "We didn't know about the Rival ourselves, or we wouldn't have been pushing these expensive brands." He muttered.

"We owe Gordon a debt of thanks for bringing the Rival to our attention. Although we wish he'd just called and told us on the phone." "These computer users are a feisty bunch," Police Chief Aldo Malmstein said." We've had a few of these cases lately, all stemming from customers overpaying for computer equipment and finding out later how much they could have saved."

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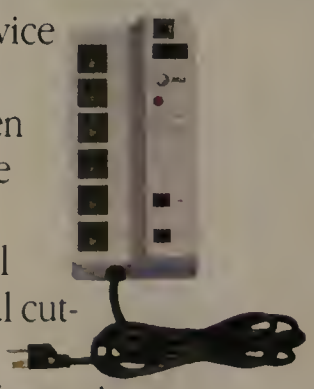

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Data Recovery Services Are Looking for Your Business

IF YOU'VE GOT THE MONEY, HONEY, THEY'VE GOT THE TIME

BY DEBORAH BRANSCUM

I almost never back up my files. Odds are, neither do you. It's every user's dirty little secret. Sure, we own backup software, but we don't like to use it very often. And even if we do back up, drives can simply die, taking our files to the grave.

But one solution has emerged in the past couple of years—data recovery services. Most of the services I spoke to use a combination of commercial and proprietary software to recover data. Most of them have clean rooms and special equipment to coax balky and damaged drives into revealing their secrets. Prices vary, but none are cheap. Generally the services need to know your model, the drive's make and its age, and the circumstances under which you lost your data (including any program you were using and what function you were trying to perform). Some of the companies will also repair your drive for an additional fee.

"I like saving people's butts on a daily basis," says Tony Alvarez, vice president of Computer Peripheral Repair, based in Hypoluxo, Florida (407/586-0011). Alvarez has production and repair experience from separate stints with Rodime and Seagate. His two-year-old company specializes in repairs but also has a brisk sideline in data recovery, with about 70 percent of that business coming from Mac owners.

"We've done work for newspapers and magazines," says Alvarez. "We've even done work for the Pentagon. They don't back up either." His company claims an 85 percent success rate, which means it recovers all of the data for 85 percent of its clients and less than 100 percent of the data for others.

ACEY HARPER

Computer Peripheral Repair's Tony Alvarez (foreground) stands over a table of damaged drives in the company's clean room.

The company charges an hourly rate of $75 for its services, with a one-hour minimum. Technicians call customers within the first hour to give a time estimate. If you have a list of files and can say which ones you want, the process is faster and cheaper. The bill for an average job varies between $300 and $375, says Alvarez, who promises data recovery within 72 hours. As a courtesy, Computer Peripheral Repair retains your files on a mainframe until you confirm that you have restored them to a hard drive.

The biggest service is OnTrack Data Recovery of Eden Prairie, Minnesota (612/937-1107). Founded in 1987 as the outgrowth of OnTrack Computer Systems (which produces hard disk utilities), the company claims a 90 percent to 95 percent success rate. Some 15 percent of its business is made up of Mac users, and turnaround time is estimated at three to five working days.

At least one competitor acknowledges OnTrack's reputation. Alvarez cheerfully concedes that OnTrack "has more money than we do and is much more sophisticated." Sophistication comes at a price, however. Customers are charged a $200 diagnostic fee just to see if data recovery is possible. Generally the total cost runs between $300 and $700, according to the company, but unusual cases have rung up bills of

(continues)

$2000. OnTrack keeps recovered data on file for at least ten days.

Customers initially talk to a salesperson, who helps them decide if sending their hard disks to the company is a reasonable gamble. Realigning heads, especially on SCSI drives, can sometimes be next to impossible. "The tracks on drive platters are smaller than a human hair and have minute tolerances," says Stuart Hanley, manager of engineering. And if a drive's heads have completely crashed into the platters and destroyed the media, you can kiss your files good-bye.

Mirror Technologies of Roseville, Minnesota (612/633-4450), announced last October that it was entering the drive-repair and data-recovery fray. Without it, the hard disk company simply didn't have enough work to keep its tech department busy, according to Tim Maroushek, manager of the tech-support group.

Mirror's DriveCare program, as it's called, caters exclusively to Macintosh owners. It's less sophisticated than larger services (the company doesn't have a clean room or use custom software, for example) but it's also less expensive. Repairs and data recovery charges are based on flat fees, with a discount for any data recovery done in conjunction with a repair.

Prices for data recovery only are based on size of disk: $97 for drives below 40MB; $127 for 40MB to 79MB drives; $167 for 80MB to 99MB drives; $217 for 100MB to 199MB drives; and $130 per hour for work on 200MB and larger drives. Maroushek says his company has an 80 percent success rate so far and a turnaround time of about ten working days.

Mace Data Recovery of Ashland, Oregon (503/488-5011), should also be noted, although the company willingly acknowledges at press time to having experience with fewer than ten Mac drives. Perhaps that's unsurprising, given that the business grew out of tech service for Paul Mace Utilities, popular software for DOS computers.

"We all use really strange things to do magic here," says Rick Sechrest, a data recovery technician. "The methods are varied—we use whatever tools are available that are already published, and sometimes we have to write something new." Mace uses existing proprietary software, but programmers on staff also write custom code as needed to recover data.

Mace charges an evaluation fee of $200 for hard disks, $100 for a set of floppies. "On the Mac, the average cost is about $350, depending on the size of drive and the extent of damage," says Sechrest. It's too soon to judge Mace's success with Macs, but the company has a 93 percent recovery success rate for PCs and turns around most of the drives within three to five working days.

Data recovery services are a little bit like emergency rooms—expensive lifesavers under certain conditions. As one company put it, "People send us their hard drives because they're in desperate straits." But you can avoid those straits by backing up regularly.

Rewarding Software Support

This year *Macworld* is cosponsoring the Help Awards together with Apple Professional Exchange (APX), a group of professional Macintosh users. We are asking *Macworld* readers and APX members to vote for the software company that offers the best support

(continues)

MARCH

APPLE WARRANTY WATCH

75 Months of Inadequate Warranty

SERVICE HEROES

Reader Robert Falson of Milwaukee, Wisconsin, had a great service experience recently with a local Apple VAR. Falson went to the company, called Heath-Zenith, to get a RAM upgrade for his Mac Plus. About a month went by before he began trying to use MultiFinder with his other programs. Much to his dismay, the Mac began to lock up. "There was no logic to when or where this would happen. But it would happen invariably every time I tried to use the Mac," he writes.

Heath-Zenith talked to Apple and determined that the Plus had a marginal system board pushed over the edge by the increase in RAM. The warranty had expired six months earlier. Heath-Zenith offered to replace the system board at cost, "which was a very reasonable offer but I still knew that I was about to be penalized because I purchased the one Mac Plus that had a marginal motherboard," writes Falson. Luckily, he had Heath-Zenith employees Terry Beede and Kevin Sandin in his corner. Aware of his disappointment, they called their local Apple Computer representative "several times and received permission to install the component at no cost to me," says Falson.

Last year Keith Taylor-Sharp of Saint Paul, Minnesota, bought a Nutmeg 19-inch monitor for his Mac Plus. Later he decided to upgrade to a IIcx, but first called Nutmeg Systems to see if the double-page monitor would work with a new machine. The reader was told he would need a new video interface board. He was also told, "if I would send in my old board, Nutmeg would exchange it for the new one needed free of charge." Taylor-Sharp didn't need a new board right away, so it was several months before he called Nutmeg and requested the new board. It was shipped out second-day air. The company "advised me not to return my old board from the Mac Plus until I was satisfied that my new machine was up and running. Nutmeg should be applauded not only for its great products but also for outstanding customer service."

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APX-MACWORLD USER SUPPORT SURVEY

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Developer Name _____

Product Supported _____
(must be filled in)

Best Service Category (select only one)

☐ Fast response to problems ☐ Easy access to help

☐ Technical level of support staff ☐ Product updates and bug fixes

☐ Other _____

Please fill out below or attach business card

Name _____

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I work for a software company ☐ Yes ☐ No

If yes, which company? _____

We must receive your ballot by MARCH 31, so please mail it early to APX Help Awards, APX Inc., 370 Altair, Box 175, Sunnyvale, CA 94086. Thanks for taking part!

for its products.

APX started the awards last year, and I was delighted to see recognition for companies that believe in customer service. *Macworld* is happy to be a cosponsor and give you an opportunity to vote for the company that treats you best. Please help us by filling out the coupon in this column. It must be received no later than March 31.

To avoid ballot-box stuffing, no photocopies will be accepted—you must mail in the actual coupon from the magazine. And you must fill in the name of a product; votes for companies only will not be accepted. (The idea is that by voting for the best-supported product, small companies have just as good a chance to win as large companies.) Winners will be invited to attend a dinner in their honor held during the Macworld Expo scheduled for April in San Francisco.

MegaMeeting in March

The fourth annual MegaMeeting trade show will be held on March 31 and April 1 at the Conte Forum on the campus of Boston College, in Chestnut Hill, Massachusetts. Sponsored by the Boston Computer Society Macintosh User Group and the Boston College Microcomputer Users Group, MegaMeeting is the largest user group show in the Boston area. The show is free to BCS members and to Boston College students, faculty, and staff. A nominal fee will be charged to nonmembers. Call 617/625-7080 for details. ◻

Send nominees for sainthood to Service Heroes, Macworld, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or Connect (Branscum). Conversely, drop Conspicuous Consumer *a line if a company is ignoring you. I will help solve your problem, if I can. If your user group is sponsoring an event, please get in touch.*

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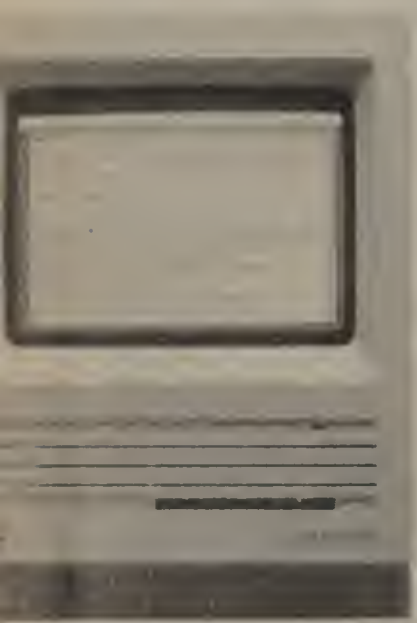

WHAT DO I NEED?

Our helpful sales and technical staff is standing by to answer any questions and take the mystery out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs — (2@$95each).

The chart explains exactly what you need to achieve the desired level of performance.

To upgrade a 4-socket Mac Plus or SE to this amount of memory	Do this: (Install in multiples of two only)
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PLI, Infinity Turbo	–	–	569	$20	619	**$26	–	–	–	–	1098	$21
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Apple Security Kit ..... 34.
Mac II Stand w/Cable Kit ..... 64.
MasterPiece Mac II ..... 105.

Macintosh SE/Plus w/Extended Keyboard Carrying Case (Targus)
Pamper your Mac with a Targus carrying case made of Zilicone treated nylon to give you waterproof durability and an impact absorbing high-density foam layer with a soft protective lining for complete protection. Cushioned shoulder pad and handles provide extra comfort and convenience. Plus there's room for everything from your Mac, a hard disk drive, and the extended keyboard to pockets for your mouse, floppies, cables, and pens. Full Targus Macintosh line available in black, blue, burgundy, and platinum (accessories) **$69.**

Studio/1 and MacRecorder (Electronic Art)
Buy Studio/1 and MacRecorder and save $50! Use Studio/1 to create easy animations and MacRecorder to add music, voice overs and sound effects. Great for presentations, interactive kiosks, training demos and just for fun! Combined, they're the complete solution for your paint, animation and sound needs. (graphics) These 2 award winning programs, which retail for $348.95, are yours for just **$211.**

PowerBacker 360 UPS Line ... 269.
PowerBacker 800 UPS Line ..... 749.
PowerBacker 1200 UPS Line ..... 949.
System Saver ..... 63.
Mobius Products
Fanny Mac QT ..... 59.
SE Silencer ..... 39.
Polaroid
Circular Polarizing Filter ..... 35.
Read-Write
CompuDuster ..... 29.
Kleen & Dry CRT Pads ..... 5.
Computer Care Kit ..... 45.
Smack-a-Mac
Smack-a-Mac ..... 9.
SoundSight
FastKeys 2.0 ..... 35.
Targus, Ltd.
Deluxe Plus/SE-XKB Case (black)... 69.
ImageWriter II Case (black) ..... 45.
Mac Plus/SE Case (black) ..... 55.

ACCOUNTING & PERSONAL FINANCES

Aatrix
Checkwriter ..... 37.
Payroll 3.5 ..... 109.
Payroll PLUS ..... 149.
TimeMinder ..... 175.
Bedford (Computer Associates)
Simply Accounting ..... 219.
Brown-Wagh Publishing
MacLedgers ..... 159.
Service Industry Accounting ..... 209.
DAC
Dac-Easy Light ..... 42.
Intuit
Quicken 1.5 ..... 36.
Layered, Inc.
at Once! ..... 289.
MECA
Managing Your Money ..... 124.
Monogram
Business Sense ..... 269.
Dollars and Sense ..... 81.

LapLink Mac III (Traveling Software)
Get everything you need for fast, simple Mac-to-Mac or Mac-to-PC file transfers, including file translators. The LapLink Mac Connectivity Pac includes a cable and software for linking two Macs or a PC and a Mac. The LapLink Mac Network Pac lets you link up to five Macs on an AppleTalk network for simple Mac to-Mac file transfers. Both versions include hard disk password security, modem connections, simple split screen design, and much more. (communications) Connectivity Pac (2 users) **$119.** Network Pac (5 users) **$189.**

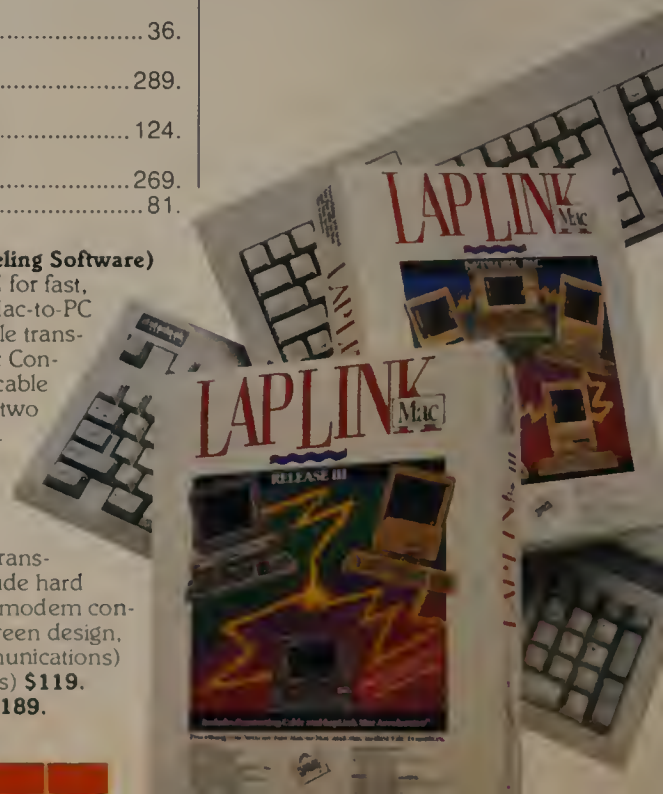
Nolo Press
For The Record ..... 29.
WillMaker ..... 32.
ShopKeeper Software
Bill-It 2.0 ..... 99.
Softview
MacInTax Federal '89 - 1040 ..... 65.
State supplement ..... ea. 56.
Taxview 1040 ..... 355.
Survivor
MacMoney 3.5 ..... 60.

BLANK MEDIA

B.A.S.F. made in U.S.A
DS/DD (box of 10) ..... 14.
DS/High Density (1.44 Meg) ..... 24.
Peripheral Land, Inc.
Turbo 40 Cartridge ..... 115.
Sony
DS/DD (box of 10) ..... 14.

BUSINESS & PRESENTATION

A Lasting Impression
ResumExpert (word vers.) ..... 39.
Adobe Systems, Inc.
TrueForm SetUp ..... 225.
AEC Management Systems
FastTrack Schedule ..... 115.
Aldus
Persuasion 2.0 ..... 339.
Antic Software
FlexForm Bus.Temp Vol 1 or 2 .. ea. 49.
Ashton-Tate
Full Impact ..... 249.



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MacInTax Federal '89-1040 (Softview)
MacInTax Federal '89-1040 guides you through the process of preparing your Federal Taxes (eight state tax modules also available at $56 ea.). Just type in the requested numbers, and MacInTax does the rest. When finished, print the completed return on the LaserWriter or the ImageWriter. If you used MacInTax last year, it reads those files and brings forward relevant items, saving time and reducing errors. Its tax planner shows the effects of various tax strategies. (finance) **$65.**

Aperture Visual Information Manager (Aperture Technology)
Aperture moves Macintosh graphics into a new dimension by integrating a precision drawing system with a powerful database manager. Aperture allows you to create detailed drawings, attach data to objects in your drawings, produce reports, link drawings together, and display data on your drawings to form complete applications. Whether you are an architect, engineer, designer, space planner, facilities manager, or someone who needs to communicate complex ideas and information, Aperture will become your program of choice.(graphics) **$729.**

SuperPaint 2.0 (Silicon Beach)
SuperPaint gives you the freedom of paint and the precision of Draw in one easy-to-use program! Features powerful AutoTrace to automatically convert bitmapped Paint graphics into high resolution Draw objects, an adjustable Airbrush, and a Freehand tool to quickly sketch editable Bezier curves. You can mix fonts, styles and sizes within text blocks, and freely rotate, scale, or slant text and graphics without sacrificing high-resolution output. Oversized documents automatically "tile" over multiple pages, in either "Portrait" or "Landscape" orientation. (graphics) **$125.**

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Cognition Technology
MacSMARTS PRO ..... 249.
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Cricket Presents ..... 285.
HyperPress Publishing
Intelligent Developer ..... 219.
Informix
WingZ 1.1 ..... 259.
Microsoft
Excel 2.2 or PowerPoint 2.1 ..... ea.249.
The Microsoft Office ..... 529.
Works 2.0 ..... 185.
Portfolio Systems
Dynodex-Instant Address Book ..... 89.
Power Up
Address Book Plus ..... 53.
Address Book Plus w/Binder ..... 99.
Calendar Creator ..... 38.
FastForms! ..... 89.

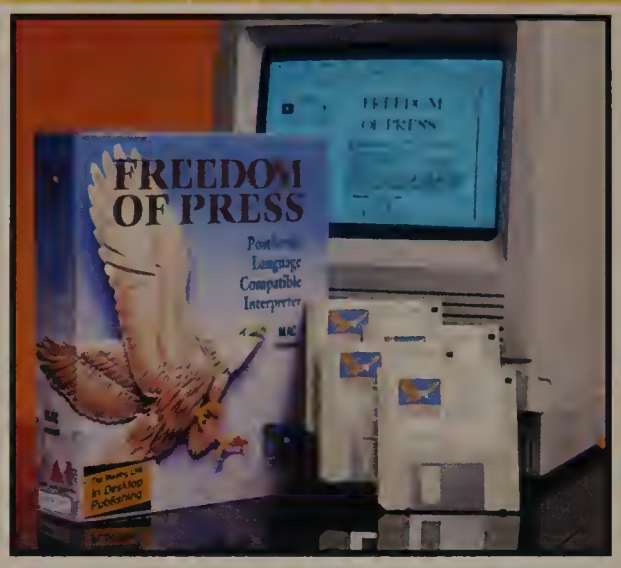
RoadRacer (X.O.R. Corp.)
Drive a high-performance 1965 Corvette through 5 environments from super high-speed desert flats to twisting mountain roads. Uses digitized sounds, with spectacular scenery, obstacles, and wild crashes. Fly over hills and around curves at up to 200 mph. Score points for fast, skillful driving by steering and accelerating with your mouse and using your keyboard for brakes and shifting. Each level is tougher than the last. Has the most sophisticated high-speed graphics ever achieved on a personal computer. For use on the Macintosh II, Mac Plus & SE. (entertainment) **$39.**

Preferred Publishers
Direct Mail ..... 54.
ProPlus
Wall Street Investor ..... 449.
Satori
Bulk Mailer 3.2.3 ..... 78.
Softstream International
Endeavour Planner ..... 95.
Symantec
More II 2.01 ..... 249.
Symmetry
KeyPlan ..... 249.
Synex
MacEnvelope 4.1 ..... 79.
MacEnvelope Plus ..... 149.
MacPhonebook ..... 40.
Vertical Solutions
FastLabel ..... 49.

CAD/CAE

Claris
ClarisCAD ..... 595.
Generic Software
Generic CADD Level 1 ..... 85.
Graphsoft
MiniCad+2.0 ..... 519.
Innovative Data Design
MacDraft ..... 175.
I.S.I.
Precision ..... 155.
Strata
StrataVision 3D ..... 375.

Freedom of Press 2.1a (Custom Applications, Inc.)
Print PostScript language files using more than 50 different printers and film recorders. In combination with your favorite desktop publishing, graphics, drawing, painting and word processing software, Freedom of Press allows you to print PostScript language files, including support for 24 bit continuous tone color images. Complete with 35 scalable and rotatable outline fonts and drivers for all supported printers. Requires Macintosh SE30, II, IIcx, IIx or IIci. (utilities) **$265.**



COMMUNICATIONS & NETWORKING

Aladdin Systems
Shortcut ..... 49.
CE Software
In/Out (1 to 5 Users) ..... 129.
QuickMail 2.0 (1-10 Users) ..... 249.
CompuServe
CompuServe Navigator 3.0 ..... 39.
CompuServe Subscription Kit 9.95
Connect Inc.
MacNet ..... 47.
DataVIZ
MacLink Plus w/Cable 4.1 ..... 125.
MacLink Plus/Translators 4.1 ..... 109.
Dove
FastNet SCSI ..... 749.
FastNet III ..... 375.
FastNet SE or SE/30 ..... ea. 375.
Dow Jones
News/Retrieval Membership ..... 24.
Farallon
Timbuktu 3.0 ..... 95.
Timbuktu Remote 1.0.1 ..... 129.
TrafficWatch ..... 129.
PhoneNET PLUS ..... 33.
PhoneNET Repeater ..... 319.
PhoneNET Star Controller ..... 839.
FreeSoft
White Knight 11.0 ..... 89.
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Smartcom II 3.1 ..... 87.
InSignia Solutions
Soft PC (Mac II) ..... 245.
Infosphere
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MetaComet
AccuWeather Forecaster ..... 58.
Microcom Software
Carbon Copy Mac ..... 119.
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NetSerial X232 ..... 279.
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NetPrint ..... 119.
FlashBox ..... 123.
FlashCard ..... 159.
Repeater ..... 129.
Teleconnectors ..... 29.
TOPS 2.1A ..... 159.
TOPS 3.0 Network Bundle ..... 189.
TOPS DOS ..... 123.
Traveling Software
Connectivity Pac ..... 119.
Network Pac ..... 189.

DATABASESOFTWARE

Acius
4th Dimension 2.0 ..... 469.
AEC Management Systems
AEC Information Manager ..... 409.
Blyth
Omnis 5 ..... 375.
Claris
FileMaker II ..... 225.
Fox Software
FoxBASE+/Mac ..... 295.

QuadLYNX Trackball
The QuadLYNX Trackball uses Honeywell aerospace technology to give precise fingertip control over cursor movement. This device offers much greater precision in cursor placement. Just spin the trackball and the cursor flies across the screen, quickly and accurately to where you want it. Great for desktop publishing, CAD/CAM, graphics and arcade games (input) **$65.**

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Full-color video digitizer, captures 8-bit or 24-bit color images from any standard video source for professional quality imaging. Includes image manipulation routines, (TIFF, PICT, MacPrint). Images are compatible with virtually all graphics applications. (graphics) Color **$349.** Also available in B&W- **$209.**

DOS Mounter
DOS Mounter is a utility that lets the Apple FDHD SuperDrive in the new Macintosh computers access MS-DOS disks from the desktop, instead of through Apple File Exchange. With DOS Mounter in the system folder, MS-DOS disks appear on the desktop and behave just like Macintosh disks. (utilities) **$55.**

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Virus detection and treatment software. Intended for individuals who have unusually high risk of exposure to viral infections, including Fortune 500 companies, and desktop publishing firms Useful for those who use public domain software or networks (security) **$55.**

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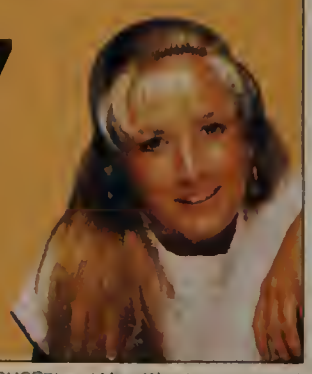

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FROM MacWAREHOUSE

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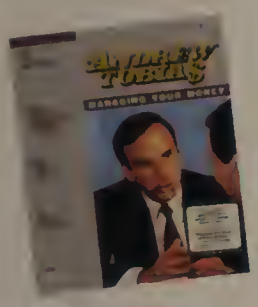
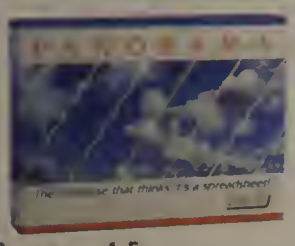


Managing Your Money
A fully integrated software program addressing every aspect of personal and small business finance. Write and print checks, set up a personal budget, estimate your taxes and more. (finance) **$124.**



Panorama 1.5
Panorama combines the speed and simplicity of a spreadsheet with a forms generator, an outliner, and business graphics. Think of it as a database manager that looks like a spreadsheet. Its macro recorder simplifies common operations. It can turn any ordinary database into an outline with up to seven levels. Panorama also creates personalized form letters (and mailing labels) without a separate word processor. Winner of 1988 MacUser Eddy Award. (database) **$257.**

Acknowledge
Create stand-alone, custom telecommunications applications with the 1989 Eddy Award winning package. Develop and use Mac-like point and click interfaces to all types of online information. A free copy of the general purpose communications program, MAcKNOWLEDGE is included. The programming environment includes a syntax checker debugger and a split window editor (communications) **$289.**

Microsoft
File 2.0 ..... 125.
Odesta
Double Helix III ..... 329.
GeoQuery ..... 199.
ProVUE
Panorama ..... 257.

DESK ACCESSORIES

Casady & Greene
QuickDEX ..... 31.
JAM Software
Smart Alarms & Appt. Diary ..... 49.
Smart Alarms (1 - 4 users) ..... 99.
Smart Alarms (5 - 8 users) ..... 149.
Smart Alarms (9 - 16 users) ..... 199.
Preferred Publishers
DAtabase ..... 69.
Vantage ..... 54.
Solutions
SmartScrap & The Clipper 2.0 ..... 45.

MiniCad+ 2.0 (Graphsoft)
This year MiniCad+ is the people's choice, winning both the U.S. and Australian MacWorld World Class Awards for CAD. For the price of most 2D CAD packages, MiniCad+ provides 2D, 3D, a hotlinked spreadsheet and a programming language. The quality is unsurpassed. (cad/cae) **$519**
Blueprint
This new professional-level 2D CAD program has it all at an unbelievable price. Layers, fillets, DXF, constraint palette, high precision, auto-dimensioning, hatching, symbol library, encapsulated postscript plus more. (graphics) **$349.**

StrataVISION 3d (Strata)
Create scenes with props, depth, shadows, textures and reflections. Adjust three different types of lighting (directional, spotlight, and point source), move camera, and rotate objects to set up the perfect rendering of your concept. Mapping allows any 2D image to be wrapped around an object. Import, manipulate and render data from other 3D formats (Super 3D, MiniCAD+, DXF, IGES), and 2D formats (PICT, EPS). StrataVISION 3d takes full advantage of the 32 bit Color QuickDraw. It prints PostScript printers, film recorders, and video recorders. (graphics) **$375.**

DESKTOP PUBLISHING

Aapps
MicroTV ..... 289.
Aldus
PageMaker 3.02 ..... 385.
PageMaker Color Extension ..... 135.
Broderbund
DTP Advisor ..... 47.
Data Translation
PhotoMac ..... 609.
Emerald City Software
Smart Art I, II, or III ..... ea. 85.
Icom Simulations
MacKern ..... 119.
Letraset
ColorStudio or FontStudio ..... Call.
ImageStudio ..... 275.
Ready,Set,Go! ..... 275.
Olduvai
Plus 1.1 ..... 115.
Read-It! 2.1 (OCR) ..... 249.
Read-It! Personal 2.0 ..... 125.
Read-It! TS (ThunderScan) ..... 79.
Quark
QuarkStyle ..... 169.
Xpress ..... 459.
Spinnaker/Springboard
Springboard Publisher II ..... 109.
TimeWorks
Publish-It! ..... 225.

DISK DRIVES/BOARDS

Aristotle Industries, Inc.
HardPac Mac 20 Meg ..... 469.
HardPac Mac 40 Meg ..... 749.
HardPac Mac 80 Meg ..... 1089.
HardPac Mac 105 Meg ..... 1229.
CMS
MacStack 20 Meg ..... 459.
MacStack 30 Meg ..... 499.
MacStack 45 Meg ..... 599.
MacStack 60 Meg ..... 649.
MacStack 80 Meg ..... 769.
MacStack 44 Meg Removable ..... 839.

Cutting Edge
800K External Floppy Drive ..... 149.
SyQuest Removable 45 Meg ..... 829.
Under the Mac 20 Meg ..... 359.
Under the Mac 30+ Meg ..... 479.
Under the Mac 45+ Meg ..... 525.
Under the Mac 60+ Meg ..... 609.
Under the Mac 80+ Meg ..... 699.
Dayna Communications
Dayna File Single 360K (5 1/4") ..... 525.
Dayna File Dual 360K & 1.44M ..... 729.
Dolphin Systems Tech
Integra 20 Meg ..... 429.
Integra 30 Meg ..... 479.
Integra 40 Meg ..... 549.
Integra 60 Meg ..... 615.
Integra 80 Meg ..... 695.
Flipper 44 Meg ..... 879.
Fujitsu
800K Disk Drive ..... 159.
Kennect Technology
Drive 2.4 ..... 339.
Rapport ..... 209.
Peripheral Land, Inc.
Infinity Turbo 40 Meg ..... 1098.
Turbo Floppy 1.4 ..... 359.
Quantum
Quantum 40 MB Raw Drive ..... 499.
Quantum 80 MB Raw Drive ..... 829.
RasterOps
RasterOps Colorboard 264 ..... 760.

The "ULTIMATE" SE Carrying Case (I/O Design, Inc.)
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EDUCATIONAL/ PERSONAL

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GEMS of the Word ..... 25.
BrightStar
Alphabet Blocks ..... 30.
Talking Tiles ..... 27.
Bootware Software
ResumeWriter Pro ..... 58.
Davidson
Math Blaster ..... 27.
Speed Reader II ..... 27.
First Byte
The Dinosaur Discovery Kit ..... 27.
The Puzzle Storybook ..... 27.
The Rhyming Notebook ..... 27.
Fair Tide Technologies
Navigate! mono ..... 199.
Help Software, Inc.
Desktop Help for Excel ..... 50.
Learning Company
Math Rabbit ..... 31.
Reader Rabbit ..... 31.
MicroTech
Elementary Signer ..... 49.
Finger Speller ..... 29.
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Mavis Beacon Teaches Typing ..... 32.
Visionary Software
Synchronicity ..... 39.
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Daily Double Horse Racing ..... 19.
GrailQuest ..... 19.
Broderbund
Ancient Art of War At Sea ..... 27.
Shufflepuck Cafe ..... 24.
Where in the World is Carmen ..... 27.
Bull City Software
Moriarity's Revenge ..... 36.
Bullseye
Ferrari Grand Prix or P51 ..... ea 32.
Fokker Tri-plane ..... 24.
Centron Software, Inc.
BlackJack or CrapsMaster ..... ea 27.
CasinoMaster (5 pack) ..... 49.
Discovery Software
Arkanoid ..... 26.
Electronic Arts
Chuck Yeager Adv. Flight Trainer .... 32.
Miles Computing
Fool's Errand ..... 32.
Puzzle Gallery ..... 27.
Mindscape
Balance of Power, Deja Vu ..... ea. 30.
Hostage ..... 30.
The Colony or Gauntlet ..... 30.
Nemesis
Go Master ..... 49.
Joseki Tutor ..... 30.
Softstream
22nd Street Whist Tutor ..... 32.
MacRummy ..... 32.
Spectrum HoloByte
Falcon 2.0 ..... 31.
Tetris color version ..... 22.
Springboard
Hidden Agenda ..... 22.
Studio Zero
Orbital Mech ..... 29.
The Software Toolworks
ChessMaster 2100 ..... 32.
Cribbage & Gin King ..... 39.
Life & Death ..... 32.
The Hunt for Red October ..... 32.

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High quality 300 dpi electronic art from one of the world's leading publishers of ready to use art. Enhance brochures, menus, reports, newsletters and presentations. One large image per file - 100 per package. Packages available: Newsletter Maker, Business Graphics, Computers & Technology, ReportMaker, Borders & Boxes and 9 others. (graphics) **$76.**

XOR/PCAI
Lunar Rescue or MacGolf 2.0 ..... 34.
MacGolf Classic ..... 53.
Road Racer ..... 39.
NFL Challenge ..... 54.

FONTS

Adobe
Adobe Type Manager ..... 56.
ATM Plus Pack ..... 109.
Fonts (full line avail.) ..... Call.
Forms and Schedules ..... 279.
Newsletters ..... 229.
Presentations ..... 279.
Textures, Fills, and Patterns ..... 129.
Altsys
Fontastic Plus 2.02 ..... 52.
Metamorphosis ..... Call
The Art Importer 2.0 ..... 89.
Emerald City Software
Type Align ..... 63.
Letraset
LetraStudio ..... 275.
LetraFonts (various) ..... ea. 69.
Tactic Software
ArtFonts Vol.I, 2 or 3 ..... ea. 55.
Orange Micro
Alphabits ..... 69.

FastLabel (Vertical Solutions)
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Images w/Impact
Graphics & Symbols 1 ..... 52.
Business 1 ..... 65.
Accents & Borders 1 ..... 65.
Adobe
Illustrator 88 1.9.3 ..... 279.
Photoshop ..... Call
Streamline ..... 229.
Aldus
Freehand 2.0 ..... 339.
Aperture Technology
Aperture Visual Information Mgr. ... 729.
Broderbund
Drawing Table ..... 75.
TypeStyler ..... 129.
Casady & Greene
Vivid Impressions Vol. 1 ..... 67.
Claris
MacDraw II ..... 295.
MacPaint 2.0 ..... 95.
Cricket (Computer Associates)
Cricket Color Paint ..... 179.
Cricket Draw ..... 139.
Deneba
Canvas 2.0 ..... 169.
Ultra Paint ..... 125.
Digital Vision
Computer Eyes B&W ..... 209.
Computer Eyes Pro Color ..... 349.
Dream Maker
Cliptures, Business Images ..... 69.
MacGallery ..... 27.
Electronic Arts
Studio/1 ..... 97.
Studio/1 & MacRecorder ..... 211.
Studio/8 ..... 299.
Graphsoft
Blueprint ..... 349.
Innovative Data Design
Dreams ..... 325.
MacroMind
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VideoWorks II ..... 175.
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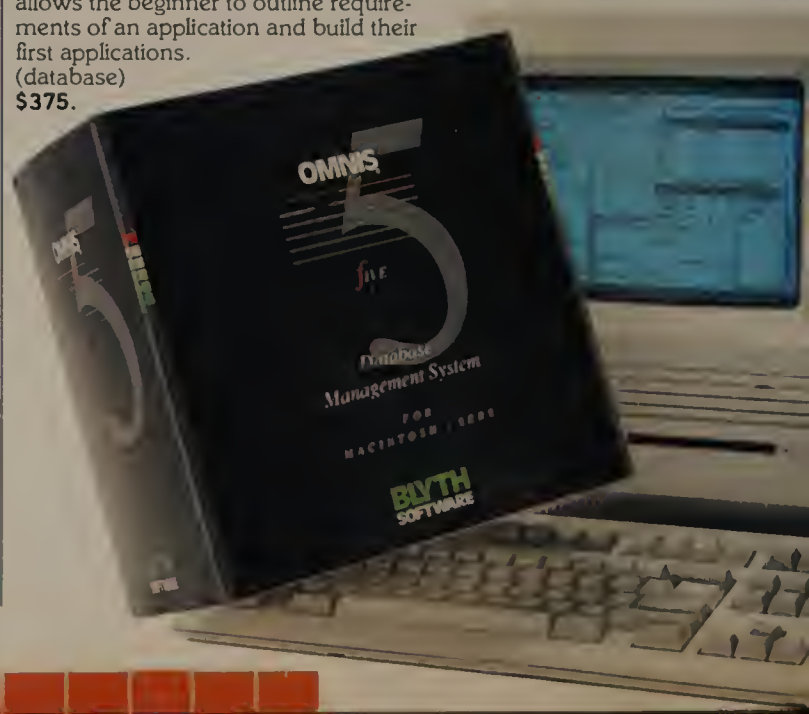
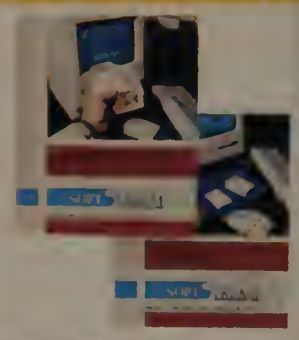
ProArt: Bus., Sports or Holidays ..ea.95.
Paracomp
ModelShop ..... 399.
Swivel 3D 1.1 ..... 299.

Omnis 5 (Blyth)
Omnis 5 utilizes the graphical interface, enhanced memory, storage and color capabilities for both the Macintosh and IBM PS/2 hardware. It is designed to produce data files that can be shared between the Macintosh and IBM PC. Multi-user capabilities gives simultaneous data access from both platforms. CL/1 and SQL connectivity allows Omnis 5 to access data from the VAX or IBM mainframe. HyperCard access is fully supported by Omnis 5. Included is Omnis 5 Express which allows the beginner to outline requirements of an application and build their first applications.
(database)
$375.





22nd Street Whist Tutor or MacRummy
Whist Tutor teaches the basics of this classic English card game, the forerunner of contract bridge. MacRummy brings two popular variations of Rummy - Straight and Gin Rummy - to the Mac for your amusement and entertainment (entertainment) **$32 ea.**

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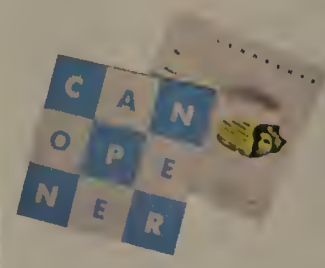
Basic Needs dust covers look great! Machine stitched and custom fitted. The covers are made from washable rip-stop nylon and won't crack, yellow, or fade like similarly priced vinyl. (accessories) **Starting at $11.**

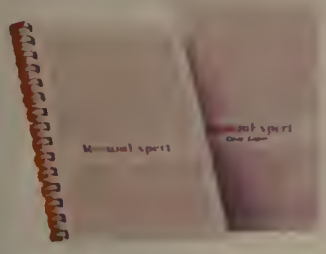


CanOpener
Information retrieval utility for the Mac. CanOpener will search anywhere, and lets you retrieve just about anything; including text, pictures and sounds. Locates text inside pictures, and gives you the whole picture! Anything you retrieve with CanOpener can be stored in its library, so the next time you need it, it's just a click away. (utilities) **$65.**

MacWAREHOUSE 1-800-255-6227

Mac-101 Keyboards (DataDesk International)
Features 101 keys including a numeric keypad, a separate T-shaped cursor keypad, Cancel Key, Option and Command keys at both ends, definable function keys, plus scrolling, page control, and zooming keys. Manufacturer's two year warranty. (input/output) **$139.** International Versions also available.

DaynaFILE
An external SCSI disk drive, DaynaFILE allows Macintosh computers to read and write MS-DOS data disks as easily as if they were Macintosh disks. Available as a single-drive or dual-drive unit, DaynaFILE can accept 5.25" or 3.5" MS-DOS disks in any format. (drive) Single drive **$525.** Dual drive **$729.**



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40+ eye-catching resume templates fully-formatted in Word. Quick and easy to use; just highlight the text and replace with your own information. Manual provides helpful writing tips. Effective for students to CEO's. Cover Letter edition also available. 4 mice rating by MacUser. (business) **$39.**

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Strata
StrataVISION 3d ..... 375.
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PixelPaint 2.0 ..... 225.
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Tactic Software
Art Clips Vol. 1 ..... 51.
Art Clips Vol. 2 ..... 65.
SoundClips Vol. 1 or 2 ..... ea. 49.
Zedcor
Deskpaint 2.0 ..... 65.

White Knight 11.0 (FreeSoft)
White Knight is Scott Watson's successor to the legendary Red Ryder telecommunications program. It's more than just a new version - the added new features list alone is more than 20 pages long! The 270+ pg. manual has plenty of step by step tips to help beginners communicate like the pro's in no time. White Knight comes bundled with Okyto, a revolutionary Mac-to-Mac file transfer program. A free subscription to the GEnie network is also provided. (communications) **$89.**

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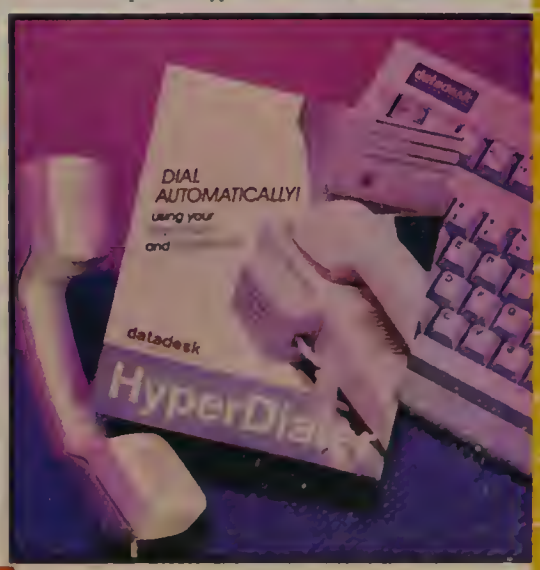
MacSnap 4S ..... 409.
MacSnap 8S ..... 818.
MacSnap 524E ..... 187.
MacSnap 524S ..... 239.
MacSnap 548S ..... 499.

HyperDialer (DataDesk International)
Now you can connect your Macintosh to your existing business or home telephone for automatic dialing with Apple's HyperCard. DataDesk's HyperDialer is designed specifically for HyperCard's touch-tone dialing capabilities and works with-line business phones without requiring a modem or dedicated phone line for automatic dialing. Automatically dials HyperCard, SideKick, Focal Point, C.A.T., SuperCard and QuickDex phone numbers. It connects to Mac speaker port - not a precious serial port. (hyperware) **$29.**



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Hayes
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Supra
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US Robotics
Courier 9600 Modem ..... 689.

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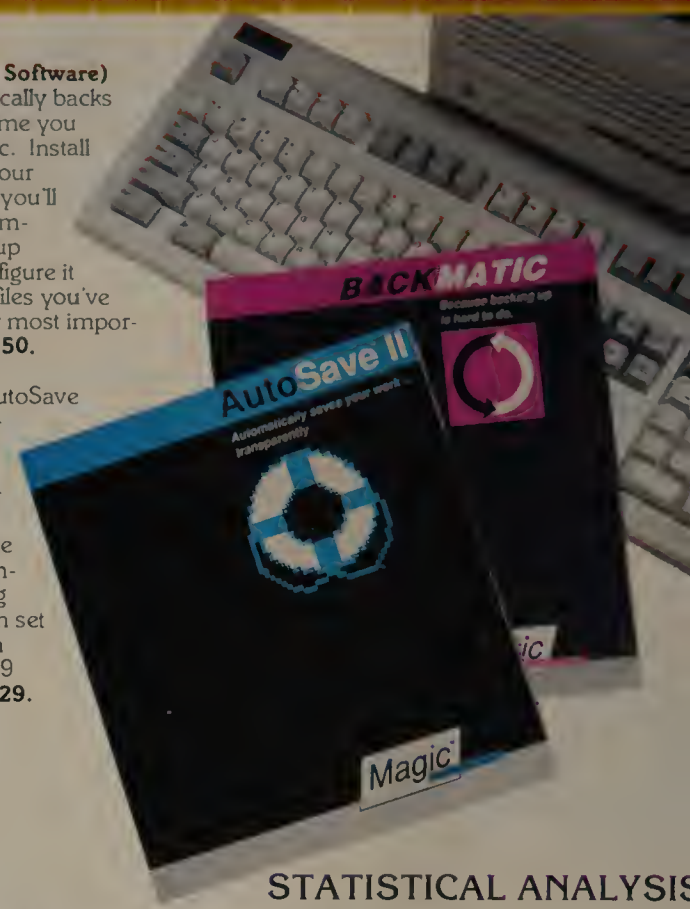
Electronic Word Finder ..... 69.
Word Finder 2.0 ..... 34.
Sensible Software
BookEnds ..... 53.
Sensible Grammar ..... 51.

BackMatic (Magic Software)
BackMatic automatically backs up your files each time you shut down your Mac. Install this handy INIT in your system Folder, and you'll never need to remember to make a backup again. You can configure it to backup only the files you've changed, or all your most important files. (utilities) **$50.**

AutoSave II The AutoSave DA is now the AutoSave II CDEV (Control Panel Device). Just drag it into your system folder, and AutoSave II will issue a periodic Save Command to the running application. You can set the interval between saves from one to 99 minutes. (utilities) **$29.**



Dreams (Innovative Data Design)
IDD, creators of MacDraft, offers a powerful precision drawing tool for professional scaled drawings, illustrations, presentations and general purpose graphics. Dreams offers zoom, rotation, layers, dimensioning, symbol libraries and a vast array of drawing tools, as well as many advanced illustration features. You can merge shapes together, cut edges of objects using other objects as templates...even glue lines and curves together to form unique shapes to be filled with colors or patterns. (graphics) **$325.**

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Shortcut (Aladdin Systems, Inc.)
Raymond Lau, author of StuffIt, has created another utility that you cannot live without. (5 mice MacUser award) Shortcut appears in every application's OPEN and SAVE dialog with a menu full of file/folder maintenance commands. A find command will locate lost files, instantly access frequently used files and folders; create new folders, rename or delete files/folders, UnStuff (decompress) StuffIt archives, and much more! (networking) **$49.**

Rapport (Kennect Technoloy)
Now you can upgrade all of your older Macs to Apple's new standard of 1.44 meg, read MS-DOS, expand diskette capacity to 2.4 meg, and backup an average of 4 meg per disk, at a reasonable cost. Mac 512e, Plus, SE and II (with cable) simply plug Rapport into the disk drive port, which allows you to read 720K MS-DOS on your internal disk drive, or read/write MS-DOS on your external Apple 800K drive. (drives) **$209.**
Drive 2.4 Drive 2.4 is an option for Rapport which reads, writes, and initializes all current IBM & Mac 3.5" standards, plus optional formats of 1.2 meg on standard disks, and 2.4 meg on high density media. Fastback II is currently being "bundled" at no charge with Drive 2.4. (drives) **$339.**

CompuServe

ou can now contact MacWAREHOUSE or place orders with us in **Electronic Mall** on CompuServe. The **MacWAREHOUSE GO code O MW** As always, you'll get fast, dependable overnight service and you can leave messages for Kerry or any of our support staff.

DiskFit 1.5 (SuperMac)
A handy utility for backing up your hard disk on a series of floppies. It saves time because it backs up only those files which have changed since the last backup. DiskFit can verify each floppy after copying files onto it, so you know that your files are safe Diskfit also discards old versions of files so your backup set doesn't keep growing. Version 1.5 supports a variety of cartridge tape drives, including the Apple tape backup system. (utilities) **$58.**

Dayna Communications
DOS Mounter ..... 55.
Emerald City Software
Lasertalk 1.0 ..... 149.
Fifth Generation
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PowerStation 2.5 ..... 34.
Pyro ..... 15.
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Magic Software
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Olduvai
ClipShare ..... 139.
MultiClip ..... 50.
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GOfer (Microlytics)
The ultimate text finder. A powerful software utility that searches, finds and retrieves text. Searches through countless files on your hard disk drive or floppy disks to find the text you need. A phrase, a fact, a note, a date. If you need it, GOfer finds it in seconds. You can automatically import the section of text into the document you're currently working in. You save hours searching through files. GOfer operates as a Macintosh desk accessory. (utilities) **$45.**

Circle 78 on reader service card

PCPC
HFS Backup 3.0 ..... 54.
Peripheral Land, Inc.
TurboBack ..... 55.
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DiskFinder ..... 27.
myDiskLabeler ..... 33.
StickyBusiness 1.07 ..... 89.
XTree Company
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Exclusively for ATM owners: give your type a change of face with TypeAlign. Rotate, wrap, skew and kern type, then add special effects like outlines and see it all on screen, instantly. Print on any ATM-supported printer including ImageWriters, DeskWriters and LaserWriters. Works with major word processing, desktop publishing and presentation programs and Adobe PostScript fonts. Also supports over 16 million colors. (fonts) **$63.**

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MindWrite 2.1 ..... 95.
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CONTEST RULES 1. Entries must be received on or before 4/30/90. 2. Winners selected in random drawings by attorneys for MicroWarehouse Inc. (MWH), whose decisions are final 3. Mac Portable Computer prize subject to availability MWH reserves the right to substitute wholesale cash value up to $6,000. 4 Winners responsible for taxes. 5. Odds of winning depend on number of entries. All prizes will be awarded 6. MWH will announce the winners on or around 5/31/90. Winners notified by mail. Dates subject to change at the discretion of MWH If unable to contact any winner an alternate will be selected by random drawing. 7 Contest is open to US residents, except where prohibited by law Employees of MWH and suppliers not eligible 8 Prizes - one Mac Portable Computer w 40MB hard disk and 150 software and media prizes

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NEW!
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(Cutting Edge)
The Cutting Edge Under the Mac hard disk drives are quiet and reliable with access times down to 20 ms making it almost three times faster than most. Push button external SCSI address switch and removable SCSI terminators allow easy daisy chaining up to 7 SCSI devices. Sizes available 20 meg to 80 meg (see line listings)
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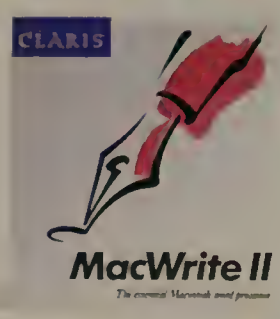

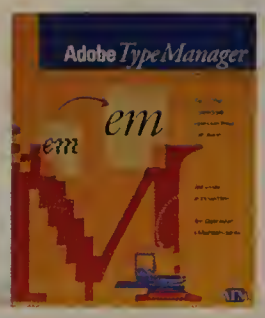

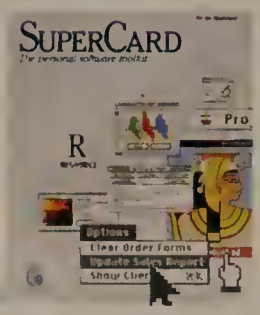

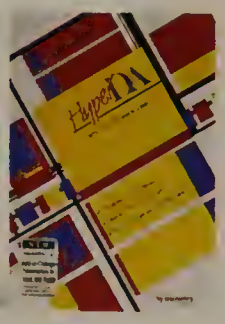

and

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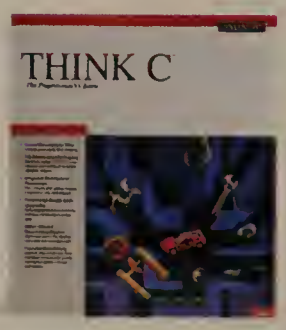
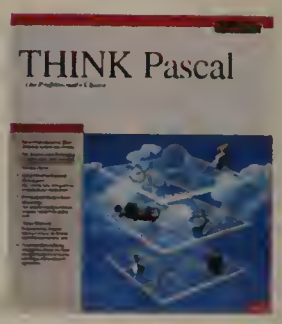
Think.





All the Macintosh® applications above were developed in THINK C® or THINK Pascal®. Could it be coincidence? Think.

SYMANTEC.™

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Circle 215 on reader service card

The 24-Bit Question

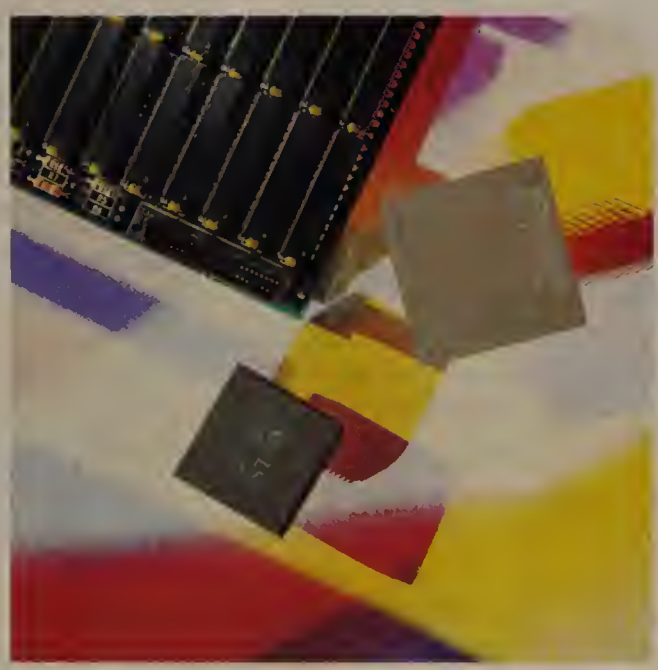
Is cutting-edge color ready for the masses?

BY THOM HOGAN

Life can be quite ironic. Here I am at that age where my eyesight begins to sour and what should I add to my desk but a 19-inch color monitor displaying 1152 by 882 itsy-bitsy pixels. There's a reason I'm exploring the state of the art in Mac monitors, aside from trying to go blind a little faster. Virtually all of the key players in video display systems (except Apple, that is) now have some form of accelerated 32-bit QuickDraw available, including RasterOps, Radius, and SuperMac.

Such QuickDraw systems appeal to artists, anyone preparing color documents for publication, and others who need both a large degree of color control and a large window size. Indeed, I now find myself doing desktop publishing two pages at a time on a Radius DirectColor system with a two-page display.

As I've pointed out earlier (see "The Slowing of QuickDraw," *Macworld*, April 1989) video display on the Mac is creaky because the Mac's CPU has to do much of the work, using software instructions called QuickDraw to manage what you see. One problem with QuickDraw is that the CPU can't do other things while the display is being updated. And the 68000, 68020, 68030 series processor is not as fast at handling video instructions as a dedicated video processor would be. That can be a particular liability with two-page displays, since they have three to four times as many pixels to update as standard Mac monitors have. Indeed, as you increase the number of colors and pixels you're trying to manipulate simultaneously—with CAD packages, for example—performance slows down even more. The CPU-memory combination in the Macintosh becomes a bottleneck through which every video instruction must pass.



PIERRE-YVES GOAVEC

Three different approaches to 24-bit color accelerators: clockwise, from the top, are shown SuperMac's VLSI chip set, RasterOps' AMD processor, and Radius's Acorn chip.

In late 1988 and early 1989 when the first large-screen 24-bit color systems became available, it was easy to gripe about display speed. The CPU was overwhelmed by the information it had to move around in memory, and you simply had to wait until that process was completed before the CPU could do anything else, like calculate a new number, find a file on disk, move the mouse, and so on. The terrible performance of these early systems gave 24-bit color a deservedly bad reputation.

RasterOps to the Rescue

RasterOps was first to hint that there might be a better solution in sight. The company's ColorBoard 118 accelerator is a complete, separate processor board that handles many—but not all—QuickDraw requests. This board has its own memory, its own processor (an AMD QPDM), and even some of its own video display circuitry.

Ordinarily, when the Mac's processor encounters a QuickDraw instruction in a program, it uses that instruction's value to determine which other set of instructions in the ROM to execute. (QuickDraw resides in ROM, except for patches that are installed into RAM memory from a System disk; on all machines except the IIci, the 32-bit portion of QuickDraw is a RAM-resident patch.) After executing the appropriate portion of QuickDraw, the CPU returns to the application for its next instruction. Thus, in the ordinary Mac world, the processor constantly bounces back and forth between executing an application's instructions and portions of the ROM instructions. The more drawing intensive an application, the more likely the processor will spend time dealing with the QuickDraw code in ROM. (Remember, one instruction in an application may equate to many QuickDraw instructions that have to be executed by the processor.)

(continues)

How Quick does QuickDraw Draw?

	Color Options	RasterOps Demo: Squares and Diamonds*	RasterOps Demo: Moving Line†	RasterOps Demo: Moving Window‡	Applications: Word 4.0 Scroll	Applications: PageMaker Redisplay§
Radius System	1-bit black-and-white	n/a	n/a	1:25.0	0:16.3	0:9.9
Mac II, DirectColor/24 video board,				1:21.0	0:16.3	0:8.6
QuickColor accelerator,	8-bit color	0:14.3	1:36.0	2:40.0	0:22.4	0:14.3
19-inch Radius color monitor	accelerated	0:14.1	1:39.0	1:25.0	0:20.0	0:12.4
	24-bit color	0:16.7	1:55.7	5:53.0	0:46.5	0:9.9
	accelerated	0:15.4	1:36.0	1:56.0	0:26.7	0:7.9
RasterOps System	8-bit color	0:14.3	1:42.2	4:00.0	0:29.9	n/a
Mac II, RasterOps ColorBoard 118,	accelerated	0:3.9	0:18.1	0:20.7	0:19.6	
QPDM accelerator, 19-inch Hitachi color monitor						
RasterOps System						
SE/30, RasterOps ColorBoard 264 SE/30,	24-bit color	0:13.0	1:17.6	4:08.0	0:46.0	0:7.5
13-inch Apple color monitor						
Apple System	1-bit black-and-white	n/a	n/a	1:02.0	0:18.6	0:8.2
Mac II, Apple video board,	8-bit color	0:15.5	1:32.0	1:14.0	0:25.5	0:9.3
13-inch Apple color monitor						

* Consecutive color boxes randomly written to the screen.
† Ten color lines that move randomly across the screen.
‡ Fixed-size window redrawn around the screen.
§ Involves 24-bit color image, which must be dithered in non-24-bit modes.
If only one number appears, then no acceleration option was available.
(times shown in minutes: seconds. tenths of seconds)

These tests validate Radius's claim that a 24-bit-color Mac system with Radius products operates at virtually the same speed as standard 8-bit color. But if true display speed is what you're after and you only need 8-bit color on a Mac II, consider a system using RasterOps' 8-bit board and accelerator. If you're after the fastest unaccelerated 24-bit solution, check out the RasterOps ColorBoard 264 for the SE/30. The SE/30's excellent performance is a result of the machine's Processor Direct Slot; virtually all of the speed difference can be explained by the fact that the PDS does not have the overhead required by NuBus video. Mac II owners should demand that Apple add a PDS to the II lineup. (Note that windows have been sized to fill applicable monitor entirely.)

The RasterOps idea was to intercept certain QuickDraw instructions and send them to the accelerator board. This accelerator understands specific QuickDraw functions (like FillRegion, DrawLine, and so forth) and is optimized to execute them faster than a 680x0. The speedup is mitigated somewhat by the time needed to pass the instruction from the 680x0 through the NuBus to the accelerator. It's sort of like a relay race for bits: the CPU has to pass the baton off to the accelerator board, which slows things down slightly at the exchange, but otherwise the two run at their maximum pace. RasterOps uses the NuBus's block-transfer mode capability to keep the amount of time it takes to pass the instruction down to a minimum. Block transfers, for example, run at about 27MB per second, while the usual NuBus transfer rate is closer to 4MB per second. Overall, the RasterOps approach significantly speeds up many aspects of 24-bit color drawing. Virtually anyone can tell the difference in display speed when the accelerator is operating.

But why does the RasterOps accelerator (and most of the available QuickDraw accelerators) intercept only some of the QuickDraw commands? Why not all? There are two quite different reasons. First, the 680x0 can handle some QuickDraw actions faster alone than by passing the baton to another processor. Second, some portions of QuickDraw are protected by patent and would be difficult to implement in a separate module anyway, since Apple's patented design requires a unique combination of CPU, memory, and video circuitry.

You probably haven't heard much about the RasterOps QuickDraw accelerator for several reasons. To begin with, RasterOps hasn't promoted it much. That's partly because the company's product lineup has been changing, and the accelerator only works with some of the RasterOps boards. More important, however, is that RasterOps' 24-bit color solution preceded Apple's. Until Apple officially shipped 32-bit Color QuickDraw in the spring of 1989, there was no official standard for 24-bit color. Indeed, the early boards from RasterOps, including the accelerator, use a different scheme for maintaining the video display information than Apple decided to use.

Official QuickDraw

Here in 1990, of course, things have changed. The Apple-endorsed color

(continues)

Image Club Graphics PostScript Typeface Library

Image Club Typeface Library

599 Ways To Avoid Helvetica

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Goudy BOLD
Goudy BOLD ITALIC

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Goudy Sans
Goudy Sans BOOK ITALIC
Goudy Sans BOLD
Goudy Sans BOLD ITALIC

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America
America ITALIC
America BOLD

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Barcelona BOLD
Barcelona BOLD ITALIC

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GOTHIC BOLD ITALIC

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Claredon
Claredon BOOK

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Clearface BOLD
Clearface BOLD ITALIC
Clearface OUTLINE
Clearface OUTLINE SHAD
Clearface CONTOUR

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Novarese

Italia
Italia MEDIUM
Italia BOLD

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ABCDE COPPERPLATE GOTHIC LIGHT
ABCDE COPPERPLATE GOTHIC

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Kabel BOOK
Kabel MEDIUM
Kabel DEMI
Kabel BOLD
Kabel ULTRA
Kabel OUTLINE
Kabel CONTOUR

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Kaufman Script
Kaufman Script

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Eurostil BOLD EXT.
Eurostil EXT. OUTLINE
Eurostil BOLD EXT. OUTLINE

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Newtext LIGHT ITALIC
Newtext BOOK
Newtext BOOK ITALIC
Newtext REGULAR
Newtext REGULAR ITALIC
Newtext DEMI
Newtext DEMI ITALIC

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Franklin GOTHIC HEAVY ITALIC
Franklin GOTHIC OUTLINE
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Friz QUADRATA
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Futura BOOK
Futura BOOK OBLIQUE
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Futura MEDIUM OBLIQUE
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Futura BOLD
Futura BOLD OBLIQUE
Futura EXTRA BOLD
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Panache BOLD ITALIC

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standard has attracted a wide range of interest. At one end of the spectrum we have video-board makers scrambling to grab market share before Apple gets around to making a board of its own. At the other end, software developers are adopting Apple's standards in their programs, meaning there is more reason to buy a video board that understands 32-bit QuickDraw. The user, in the middle, is the winner, at least in this case.

As I write this, RasterOps, Radius, and SuperMac all offer both 24-bit color boards and companion accelerators. Each company seems to have a slightly different take on how the acceleration should be done, so each accelerator is somewhat different from the others. RasterOps uses an AMD processor, Radius an Acorn (British) processor, and SuperMac its own proprietary VLSI chip.

RasterOps and Radius use separate accelerator and video boards that communicate with one another through the NuBus. This has the advantage of allowing acceleration to be an add-on feature and the drawback of wasting valuable time communicating through the bus. In my opinion, unaccelerated 24-bit color is pretty much unusable, so the option of adding these accelerators is not really an option.

SuperMac's accelerator, called the Spectrum/24 Series III, takes an all-on-one-board approach (owners of the low-cost ColorCard/24 can buy an add-on version of the accelerator for less than $500). Consequently, the Series III does not require an extra NuBus slot, and it should run slightly faster since it doesn't have to relay communication between the accelerator and the basic video functions. More interesting, however, is SuperMac's claim that its board accelerates *all* QuickDraw operations. I haven't been able to evaluate this claim since the board was introduced just as I finished writing this column, but if it's true, the SuperMac board should be even faster than the RasterOps and Radius boards I did evaluate. The Series III board represents the approach I think we'll see more and more third-party developers take: a stand-alone, performance-oriented module that works with software independent of the Mac's CPU.

So How Fast Are They?

But all three available QuickDraw accelerators perform basically the same function: speeding up the Mac's display of the millions of pixels that make up a 24-bit display. The question you've probably been waiting for me to answer is how fast are they?

Radius, for example, claims its 24-bit accelerator makes 24-bit color perform at the speed of 8-bit color. SuperMac goes further, saying that its product makes 24-bit color perform like unaccelerated 1-bit monochrome. RasterOps doesn't publish any such claims (at least none I've come across), but simply asserts that its accelerator–24-bit combo performs better than Radius's.

Well, it seems obvious that I needed to run a few tests to sort out these

claims, so that's just what I've done. As you can see from the results in "How Quick Can QuickDraw Draw?" the Radius combo does come quite close to standard 8-bit color performance. A few of the tests show it to be slightly slower, a few slightly faster, a few about the same. In general, I think the results justify the claim.

That's especially true when you consider that I biased the tests slightly against the 24-bit color displays. The Word 4.0 scroll test, for example, which scrolls one page at a time, doesn't factor the different screen sizes. The 24-bit color display had about 800 pixels to scroll at a time, while the standard color display only had to deal with about 450. I purposely allowed this difference for one reason: it mimics the way we tend to use each of the systems—we tend to use the entire screen whenever possible. Thus, the fact that the Radius 24-bit color system performed about the same as the standard Apple color system is quite an endorsement. Without sacrificing speed, you get almost four times the screen area to work with and 24-bit color to boot.

Personal Observations

I'm most familiar with the system I have at home, which includes a Radius two-page display, 24-bit color board, and accelerator. Radius challenged me to leave 24-bit color on all the time. Had I tried this with any system a year ago, I'd be writing this from the loony bin (if I was writing anything at all). I'm a frenetic worker, often mousing along ahead of the system, moving windows and drawing things all over the place. I have to admit I'm a speed freak when it comes to computers—I even think a IIci is a bit slow at times. Thus, it really was a challenge for me to leave on 24-bit color. But I did. For the last month I've done my usual work in PageMaker, Word, Excel, FileMaker, and Tycho with 24-bit color on, even though none of these programs has much if any ability to use the extra subtleties 24-bit color provides.

I've been pleased by the results, at least as far as performance goes. Even though I had to take my Orchid MacSprint II board out in order to get the Radius system to work properly, I've noticed no particular slowdown due to the video display. My documents scroll and appear at about the same rate as before, albeit in a much larger display area.

My complaints fall in other areas. Take the monitor itself. Radius, like most of the other companies, uses a Sony Trinitron monitor as the base of the system. These monitors are heavy and take up an enormous amount of desk space (Radius supplies a monitor stand to fit around the Mac II, but since my Mac II is under my desk, it didn't help me any). To get the 1152 by 882 resolution into the 19-inch diagonal display, the monitor is used in a noninterlaced fashion with a vertical refresh rate of 72Hz. The problem I have is not that the monitor flickers (which usually only happens with refresh rates of 60Hz or lower), but that it jitters—a

(continues)

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problem largely evident when I'm using the Apple 13-inch color display sitting next to it. Once I switch off the Apple monitor, the jitters are much less apparent.

Another problem I encounter is drifting convergence. When my monitor is first turned on, its red, green, and blue guns are not aligned correctly. As the monitor warms up, they seem to drift into convergence. So I've learned not to try to sit down at the monitor and work right after turning it on. To do so is frustrating since I'll find myself constantly adjusting the V-Stat and H-Stat controls to try to focus the picture. Instead, I wait half an hour or so before trying to use the system. Not all Trinitron monitors have drifting convergence, but this is not the first one I've had this problem with: so I guess I'm just on the unlucky end of the review-equipment queue.

Next in the list of problems is that of the Mac II's power supply. The Radius combination of boards draws 7 amps of +5 volt power. Apple says that at this voltage the Mac II power supply is capable of putting out 18 amps of power, of which only 12.8 amps should be drawn by expansion boards. That means that in just two slots I have used up more than half the available power, so it's unlikely I could ever fill all six slots with the Radius boards already grabbing all that juice. Indeed, the amount of heat my machine throws out (with three boards installed, 5MB of RAM, and an 80MB hard disk) is prodigious.

On the software side of things, I've noted a few strange occurrences that seem to be attributable to the Radius DirectColor system. As I already noted, the Orchid MacSprint II board and caching software don't work with the DirectColor system. What's frustrating is that everything will appear to work but then quit the first time I select a menu bar or dialog box. Even turning off the MacSprint II board's caching didn't help. Apparently the board changes the timing on the CPU's external bus connections just enough to interfere with the DirectColor board; I had to completely remove the MacSprint II from my system. Of course, I suspect other such add-ons, like Dove's new caching board, might have similar problems, but I haven't been able to verify this. Therefore, the usual caveat applies: if you're looking at these 24-bit color systems, make sure you have an expert install them and test them with the options you use in *your* machine before you accept the purchase. And while you're at it, check out the power draw to make sure that you aren't exceeding Apple's guidelines.

Other side effects of installing DirectColor seem minor and, at worst, are merely annoyances. One example is that I use the Kolor CDEV to color the interface. If you make changes to the interface colors with 24-bit color active, I can promise you that the interface colors will change when you switch to 8-bit color mode. However, if you use Kolor in the 8-bit mode and then switch to 24-bit mode, colors remain pretty much the same. This is true of all color definition. Anytime you choose a color when 24-bit mode is active, you stand a high risk of picking a color that is not closely matched in the 8-bit mode. So always pick colors in the 8-bit mode unless you're selecting a color you will only use in 24-bit mode or for which you need the extra subtlety. That seems obvious enough once you start using the system, but nowhere have I seen this simple rule of thumb stated.

It's Show Time

Buying a 24-bit color video display system without buying an accelerator for it is just nonsensical and bound to lead to frustration. Luckily, the $795 Radius QuickColor accelerator seems a bargain when you consider that it makes a previously unusable system practical. With the availability of such products, I can only conclude (despite minor nitpicks) that accelerated 24-bit color systems are finally mature enough to win a permanent place on desktops. Yes, Virginia, there is a 24-bit color system that looks like it's finally ready for prime time. ■

This is Thom Hogan's last column for Macworld. *Thom is president of Macreations, publisher of the Tycho table-making utility, and author of a number of computer books, the most recent of which is* Programmer's Apple Mac Sourcebook *from Microsoft Press.*

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Verbatim

An interview with Richard Skeie, president of CE Software

Richard Skeie grew up in Des Moines, Iowa. After a stint in California as a contract programmer with BASIC Four Computers, Skeie returned to Iowa in 1978 to found Computer Emporium, one of the first, and the largest, of Iowa's computer retail stores. In 1979 he founded CE Software as an offspring of the retail store. The company now has about 30 employees and will grow to a $10 million company sometime this year. Together with Don Brown, vice president of engineering, and John Kirk, CFO, Skeie has made CE Software, one of the last independently owned producers of Mac software, into one of the most successful.

MW How do you think your business experience with a computer store helped you become a computer software developer?

SKEIE In the early days I gave talks on how to start small businesses because of the lessons I had learned starting the company. For example, my budget for advertising the Computer Emporium consisted of talking about the store wherever I could. I told groups how not to do it. I talked to people about how to start a small company and gave them information about computers.

Computer Emporium sold Alpha Micro computers on the high end and Apple IIs on the low end. When we opened our doors, we spread out our arms and said, here we are, come and get us. In the first month our total sales were one magazine. In the second month we doubled our sales—two magazines. There was a 100 percent improvement, from $2.06 to $4.12, but we got in trouble for paying taxes late on that money. In the third month we sold 12 systems and made up for the first two months. We lost four of our seven investors in the first few months.

MW When did you start developing software?

SKEIE In 1979. Our first product was MFI, a multifield inventory for the Apple II. The database was written in BASIC by Don Brown. Don was a college student at Drake, majoring in actuarial sciences and minoring in computers. I told him that if he came to work for us we would build a business around him. It has worked out incredibly well. Don remains today, with a staff of seven programmers, and is still the visionary that pulls it all together.

MW Did your first product succeed?

SKEIE It kind of went by the wayside. Our first nationally focused product was Sword Thrust, a series of adventures based upon the first package of the same name. We did national ads for that program. We had Mission: Escape, our first graphics application. We did Wall Street, a stock market simulator. Then we went into business software.

MW When did you start work on the Macintosh?

SKEIE When the Lisa came out we shelved everything else and went into development for the Mac. By the time Lisa was shipping, the Mac was in the air, so we began Mac development on the Lisa. The first product was DAM, Desk Accessory Mover. It was a full year before Apple developed a product, Font/DA Mover, that was similar—which they proceeded to give away. So we stopped development for DAM. That was the last time we stopped development on a product because Apple was going to give one away free.

An interesting note on DAM: when we discontinued it we got a massive number of dollars from users who had used and not paid for the software.

PHOTOGRAPHS BY DAN ESCOBAR

One of those quirks of human nature. Part of the psychology of shareware is the process of procrastination, which works against developers.

MW DAM was similar to Apple's Font/DA Mover?

SKEIE They looked similar, but Font/DA Mover created files that weren't compatible. We later wrote a conversion program. And at the time they shipped DA Mover we had thousands of copies out there of our product. We sold it as shareware for $15. We also

(continues)

had DAs that went along with DAM, like Executive Decision Maker. It was kind of a joke product, like one of those black eight balls that you turn upside down and it says, "Concentrate and ask again."

The biggest end-user problem at the time was to take DAs off the system. Essentially with DAM you had the ability to put DAs in place, take them away, and save them as files to be moved to other machines. Apple's product did that and saved fonts all in the same program.

MW Wasn't that early for shareware?
SKEIE It may have been the first shareware product on the Mac; I'm not certain.

MW How did you distribute DAM?
SKEIE With bulletin boards and user groups, we shotgunned it to all of the people that we thought were important for distribution. Inside we had a message that if you used it, to please send in $15.

MW And you made money like that?
SKEIE Oh yes, considering we only had Don Brown and the Computer Emporium clerks for support and paperwork. We have always had fairly low overhead.

MW How big is CE Software today?
SKEIE About 30 people, and we're still based in Des Moines. As to the number of products we have, you have to start with QuickMail. There are lots of related products, so it's hard to count, but I'd say 9 to 14 depending upon definition.

MW After DAM?
SKEIE We started creating desk accessories. We did MockWrite. Mock was a takeoff on the name MacWrite. Mock was a takeoff on all the products named Mac-this and Mac-that. We did MockPrinter, MockChart, and MockTerminal. Later we put out the Mock software as MockPackage for $25. We also designed a product that never saw the light of day, which was named MacDesk. A week before its debut we sold it to Borland.

MW What was it called by Borland?
SKEIE SideKick for the Mac.

MW Did Borland do well with it?
SKEIE Probably. Definitely it sold in the tens of thousands. We heard a rumor that the preorders were for about 40,000 units. That experience caused us to decide to become our own publisher. That process of selling products into someone else's hands made us think of merging the process of development and publishing.

MW What has happened to the MockPackage?
SKEIE There have been many additions. Now it's the MockPackage plus utilities like Aask (an INIT manager), CDEVs (EZ Menu, Widgets, Control-l, LaserStatus), and an AppleShare program called Foldershare, which allows preferences to be set.

MICROSOFT IS AN AWESOME MARKETING FORCE, BUT THERE ARE PEOPLE WHO EXCEL IN COMPETITION WITH THEM

MW So you have left the shareware market?
SKEIE In terms of community involvement we occasionally give things away for free. Vaccine [an antiviral utility] is an example. It's another category of product, called freeware.

MW When did you distribute that?
SKEIE When the virus outbreak hit, during that turmoil. Don Brown's response was to write a temporary protection product. When the situation arose we had a meeting and said, What a great market to be in. There would be automatic upgrades, built-in demand, and we thought, Boy, that's damn cynical for the customer.

If you want something to go away, you ignore it. Safe backup techniques are some of the things that you use for protection against a virus. A perfect example is our manufacturing process, which is done in an isolated area. We back up our programs frequently. We write-protect disks before we place them in someone else's machine. Our philosophy with Vaccine was to get something out to everyone instantly. We gave Vaccine to safeguard everyone, free of charge with no update promises—to bulletin boards, to user groups. Sent it to all the sources we thought were distributors, CompuServe probably first.

MW Will CE still write shareware?
SKEIE No. Freeware is given to the community that is our roots, or an integral part of the Mac community. It's part of the give-and-take of our work. Doing things once and then giving them away free is our way to participate.

Our product Calendarmaker actually began as a gift to customers. Its first distribution was public, after the Mock Package. We never intended Calendarmaker to be a product. We sent it out to our customers instead of a Christmas card. We put a MacPaint file on it and sent it out with the calendar. Our customers suddenly gave us a lot of feedback on what they would want in a calendar product.

MW Do you still have any Apple II products?
SKEIE We still occasionally fill an order, but rarely, and for the most part we ignore that market.

MW What is your best-selling product?
SKEIE QuicKeys is our best-seller in terms of units, QuickMail in terms of dollars. QuicKeys is in the ballpark of 100,000 units and sells for $99.95 retail.

MW Are DAs and INITs going away, as Apple indicates?
SKEIE If that's true, then Apple seems to be making its own. Look at how Apple wrote the access to its CD ROM —with a DA. I'm hard-pressed to give examples, but Apple regularly embraces DAs in its work. System 7.0 will support DAs and INITs while offering new ways to get those capabilities. Apple's position is that DAs as we know them today will go away. And if you believe that System 7.0 will be on all machines overnight, then that's possible; but if it takes two years, then I know some developers who will kick themselves for not capitalizing on the usefulness of DAs. Like Dave Johnson of Working Software with Spellswell: he could have developed DA access

(continues)

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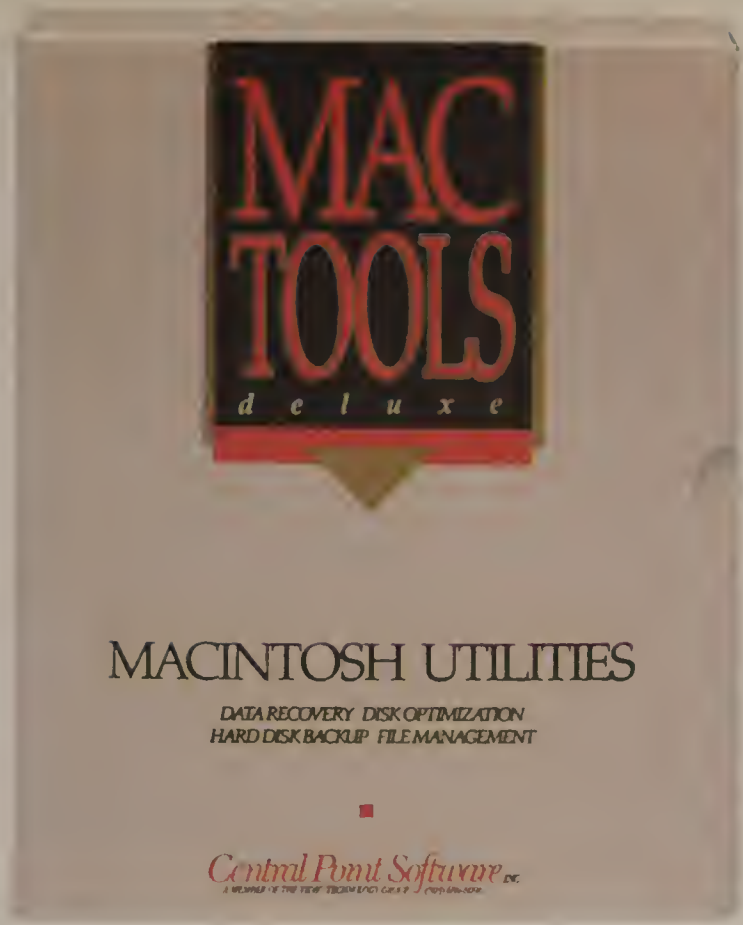

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earlier, but he took Apple's position literally a year or more ago and now regrets it.

MW What software do you most admire, not including your own?
SKEIE PageMaker, which has been instrumental in our business for changing our ads and materials to be responsive to our customers. I'm a Microsoft Word fan, or should say I was; I recently started using MacWrite II. I like its versatility of automatically converting the files of others who are not using the same program.

MW What is the best DA for the Mac?
SKEIE The sexiest I have seen—simple, honest, and straightforward—is Kiwi Envelopes. I love Acta. DeskPaint is another.

EVEN AN EXTREMELY SMALL COMPANY IN THE MAC MARKET IS STILL VIABLE. THERE ARE LOTS OF NICHES.

MW What's the origin of the problems of INITs?
SKEIE That's a bit out of my realm. Apple gave us the capability to do INITs without creating a shell of safety to go around them. There is no management of INITs in the system; they conflict with each other. Essentially, the lowest-named INIT [by alphabetical arrangement] loads first. There is nothing in place to say what resources an INIT gets. Also there's the matter of poorly written INITs. And because INITs don't reserve system heap, you run out of room for programs in the system heap. When there is no memory for them, they do flaky things. Several well-written INITs work great together. Our support department says it goes into fits when someone calls in with 60 INITs, 40 of which we've never heard of.

MW What's AppleMail all about?
SKEIE It's a twinkle in the eye of its creators. But seriously, I don't know what Apple is doing. Since they're trying to be more responsive to the developer community, my guess is that Apple will provide a suite of protocols and system capabilities into which developers can tie application aspects, rather than directly competing. We'll see. Apple's not talking about AppleMail because it's too early for them to know what they're doing with it, or even if they're doing it, and I'm not in a position to speak for Apple.

Our advantage is that we tie into other platforms. If that is central to Apple's strategies, we have to worry, but I don't believe it is. If not, Apple's adding a check mark on the list of features for Mac products.

MW How can CE Software compete with Microsoft Mail?
SKEIE Well, we don't second-guess them. We're responsive to the market and, as always, we move fast. We had QuickMail out one year ago, now we're in version 2.0 within six months of the first release. We had a number of mail firsts: extensibility, store-and-forward messaging, gateways. And we provide unparalleled service.

MW Prove it.
SKEIE We received an award from the members of APX [Apple Professional Exchange]. They polled their members and asked who gave the best support on products. We came in first for QuickMail and second with QuicKeys in a three-way tie for second.

MW How can a small computer company compete with the larger companies such as Microsoft?
SKEIE If a product such as mail becomes the most important product to Microsoft, we can't. But if they treat it like any other product, we can. We focus on it. We have six developers on mail. Their development group is actually smaller than ours. They're an awesome marketing force, but there are lots of people who focus on products and excel in competition with Microsoft.

Wingz is doing quite well, for example. WordPerfect was a small company that came up against Microsoft and others. Even an extremely small company in the Mac market is still viable. Niches are now the size of the

(continues)

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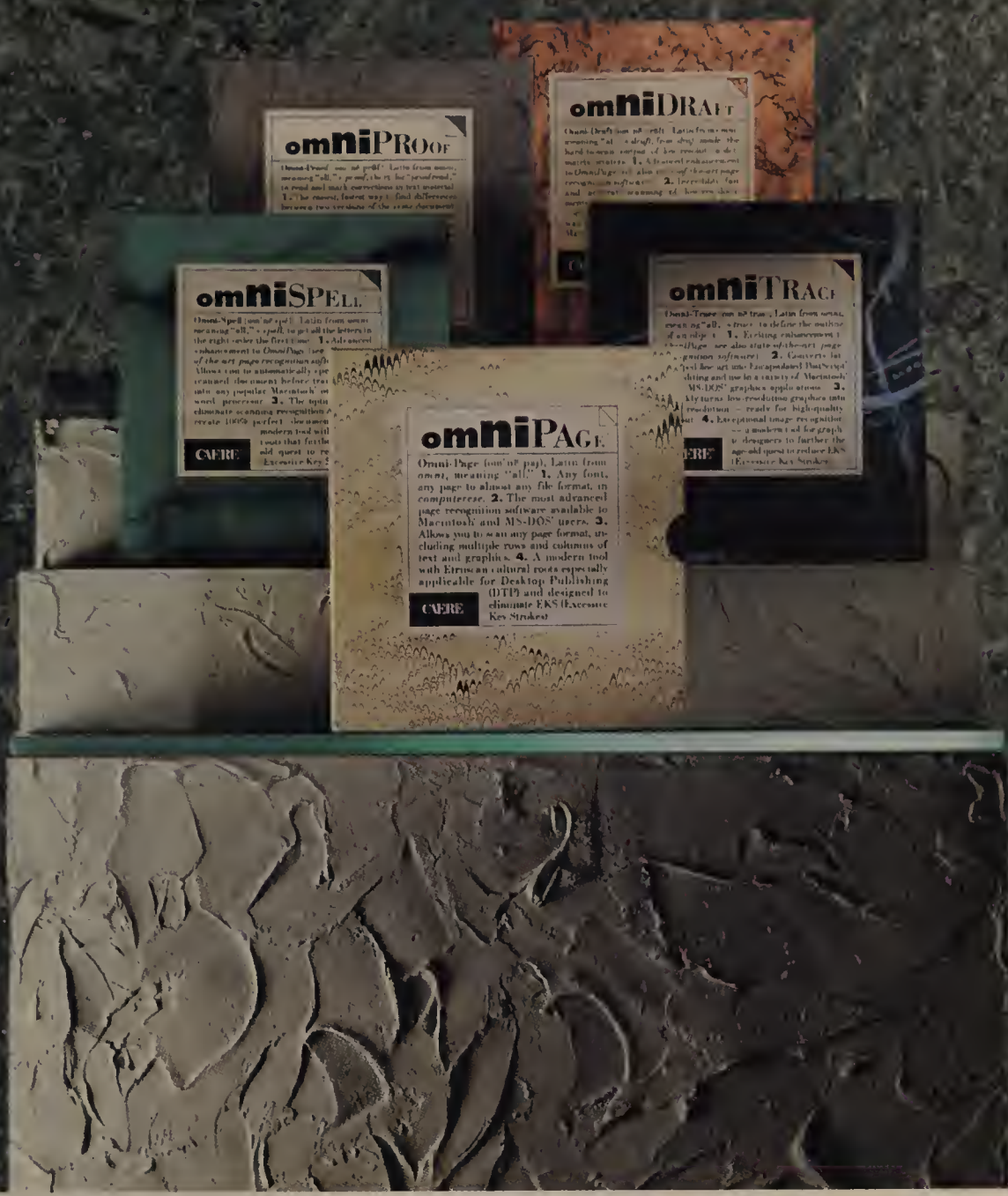

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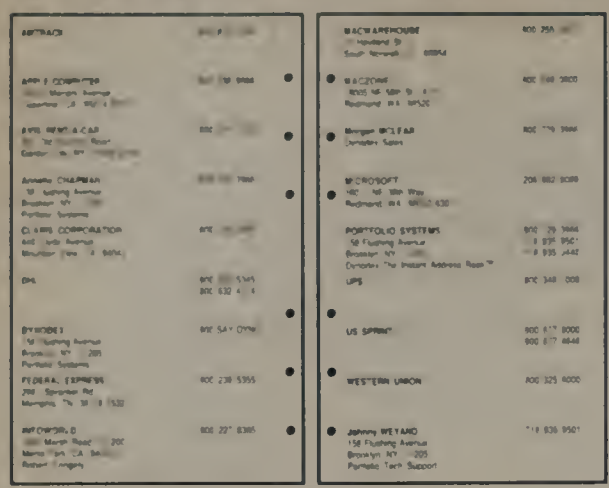

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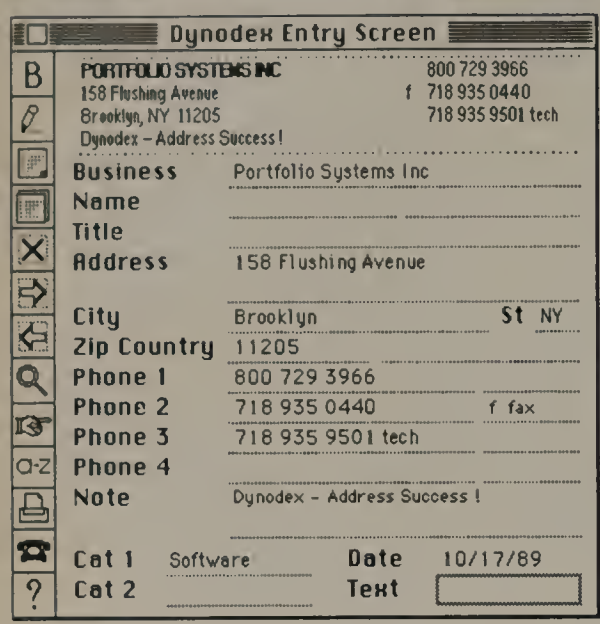

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entire original Mac software market. There are lots of niches, and small companies such as Magic doing a new breed of utilities. If a small company has good business practices, it will make it. The opportunity is in being able to focus on niche markets.

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MW How many people are using your mail package?
SKEIE We have sold over 150,000 nodes. A lot of those have replaced other mail systems.

MW Any observations on HyperCard?
SKEIE There is a battle for the interface standard on the Mac. HyperCard is a very useful tool, but it's not replacing mainline applications as was initially anticipated. We make XCMDs for the large and active HyperCard following. It is useful for user-programmers, but I think it is failing to achieve expectations in the commercial realm.

MW What's the future of HyperCard?
SKEIE I don't know. If I were guessing, I'd say it would become more a part of the System.

MW What about AppleScripting, which the company has announced?
SKEIE That's definitely a step in that direction. A big issue is that HyperCard has a different interface from the Mac. Apple has to be working to tie those two environments together.

MW What's the worst bozo Mac product you can think of?
SKEIE There are two answers: programs I don't like and so I can't think of them, and ones I take off my hard drive and put back on the shelf. One program accepted by CE Software people is called CAT. There are a number of people at CE who organize their lives on CAT. I don't—I hate it. It's a bozo because I can't casually learn it.

The worst product I can think of was a database, DB Master, from Stoneware. It was a great product on the Apple II but Stoneware never learned to write a product for the Mac.

MW What's your favorite CE story?
SKEIE InvisiCalc. Several years ago Don Brown was walking down a hall by several offices. Someone leaned out and asked what he was working on. He pulled a floppy disk out of a nearby trash can, one with the media ripped out, held it up, and said, InvisiCalc.

We made a label for the disk, threw a press conference, had a product announcement and press release announcing InvisiCalc, which we said was compatible with everything. At the party celebrating its announcement, we arranged a fictitious call from VisiCorp lawyers. We had great demos. We had requests for orders, a great volume of orders. We were written up in the Wall Street Journal, which recognized it as computer humor. We made 10,000 of the disks, had an artist do the manual, shipped our orders in two weeks, and it all died. It was the last time we did software as a Pet Rock, but we had a ball.

MW There is a rumor that you have more than a professional interest in the Mac community.
SKEIE I met my wife at an Apple developer conference, over a business lunch at which her company discussed producing mail over a gateway from UNIX. The gateway worked out, and so did the relationship. This is an example of personal connectivity joining Silicon Valley with Silicon Prairie.

MW Will you sell out your company to someone else now that it's growing?
SKEIE I'm not very motivated by the prospects. We've thought about it in terms of our opportunities, and we've decided that we like what we do. We're more likely to build a company to be taken over by the employees than by outsiders, but you can never speak with certainty about the future.

MW When did you realize that CE Software was going to be a big company?
SKEIE At the introduction of QuicKeys, when we essentially bet the company by creating ads and spending a

(continues)

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$45,000 monthly budget when sales were only $30,000 per month. That's the biggest risk we've ever taken, but we considered it a safe gamble.

I don't want to take too much credit for the company's success. My value to the company has been in recognizing good people. CE Software has succeeded because I recognized the genius of Don Brown and had John Kirk who was the CPA and the legal strength of the company as we grew.

MW What's the future of Macintosh computers?
SKEIE It's a bright one if Apple manages to produce a low-cost Mac. They're creeping up on entry-level computer users, but if they do address that market so that an average blue-collar family could buy one, Macintoshes will have a rosy future. Apple has a good future, regardless.

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MW What about the future of Macintosh technology?
SKEIE I buy into what Apple says publicly. I buy into the vision of computing as a ubiquitous part of people's lives. Of pointing my watch at a wall and talking to a computer "agent."

MW What about the people with 128K, 512K, and Mac Plus machines?
SKEIE I'm not sure; it depends on what they want to do. For kids and schools they can buy a used Plus or a 512 machine and get exposure to Mac technology.

MW I'm talking about those people who want to keep up with the features of the current operating system, but have older machines.
SKEIE I'm getting a Portable, Don Brown wants a IIci. We have different needs: I move about, he wants power. Again, Apple has a range of products. If you want color or add-ons, there are different models.

MW How about those users with older machines who feel disenfranchised?
SKEIE I don't have much sympathy for that. Asking Apple to stop development is absurd. If the buyer wants a different machine, OK, because if Apple stops development they'll have to go to another company for a computer. Apple will simply go out of business; they won't remain competitive.

MW What do you think of the recent announcement by Microsoft and Apple of a cross-license of basic technology?
SKEIE I don't know [laughs]. I think it's a way of being more effective in computing. Some effects are more political than functional. But I don't know enough about it. It's entertaining.

Political as it is, though, it's good due to competition. Competition makes better products. Maybe that's a naive approach, but it's reality.

MW Has Apple changed its way of dealing with its third-party developers?
SKEIE We're getting a lot more support from Apple these days than we ever did in the past. When a third-party developer is doing an application important to Apple, they get lots of attention from Apple. But Apple now has some 10,000 registered developers, so there's no way to give them individual attention. And the small software developers don't have the resources to figure out who to talk to, so most go unnoticed—unless they're clever with their products or if they find the right people at Apple, in which case they get support. Apple has good intentions.

MW What is going on with online services?
SKEIE Do you mean why are there so many emerging now? For a variety of reasons. People in companies have started to communicate with each other on these services. In a sense they're tying companies together. A large part of that is services. I think that several things are coming together, making up wide-area E-mail.

There is the additional purpose of these services as a forum of common interest, while big differences in geography are disappearing. Online services are just being discovered by a lot of people. A parallel example is in

(continues)

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TV. The home shopper club provided by Prodigy is growing by leaps and bounds.

In relation to online services, videotex services in general have such rotten services and such convoluted access methods, and there is little opportunity to make them friendly. A perfect example is doing an airline schedule. A front end would probably make that accessible to a lot more people, but it would put a lot of travel agencies out of business.

MW What area of Macintosh software is going to show the most growth in the near future?
SKEIE The applications will focus on multimedia, and I don't like that it's been overblown, for all its flashiness. The fact that Apple is focusing on it means that the area is going to be flooded with competition, but Mac software is growing on all fronts.

MW You're one of the remaining founders of a company from 1984 in Mac software. Where have the rest gone?
SKEIE No, there are three of us. A lot are still around, but we just become visible because we are in an area that the industry chooses to make visible. Tom Evslin of Solutions, Inc., Charlie Jackson of Silicon Beach, and Dave Winer are all still around. There's Scott Watson, too. And at different times all of these people surface. Some have made lots of money and disappeared from sight for a while.

MW Nevertheless, the Macintosh software industry is increasingly dominated by larger companies.
SKEIE Little companies are flocking to big companies as a matter of self-protection. That's not necessarily the right solution.

MW What would you change in the Mac environment if you had the power?
SKEIE I'll take a little license with that. If I were in control of Mac technology I would figure out a way to license it to everyone. There is that expression that Apple is a software company and that software adds the value to the computer. Novell is an example of a software company, though some believe that it is a hardware company selling networking hardware. They've made great innovations in that way [considering themselves a software company], and if Apple began to think that way, then they could succeed by putting technology, not boxes, into everyone's hands. But I don't know what problems are involved in that approach.

MW Apple makes most of its money from hardware sales.
SKEIE But if they were making money from, or were paid a royalty on, everything that a hardware manufacturer sold that included the technology that they owned, that would seem to be enough.

MW That sounds like the kind of situation for which Adobe has been so regularly criticized.
SKEIE The Adobe issue in part arose from the fact that they added so much money to the cost of a printer. And if they had played the politics differently it might have been different. ◻

Interviewed by Jerry Borrell

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	Forecast	$6,453	$8,800	$10,050	$9,460	$12,000	$18,900
	Variance	$1,947	$3,500	$3,850	($760)	$1,000	$2,400
	%	**130%**	**140%**	**138%**	**92%**	**108%**	**113%**
Cost of Goods Sold	Actual	$1,848	$3,198	$3,475	$2,262	$2,860	$7,663
	Forecast	$1,549	$2,288	$2,312	$1,608	$2,640	$3,969
	Variance	$299	$910	$1,164	$654	$220	($3,969)
	%	119%	140%	150%	141%	108%	0%
	Gross Profit	**$6,552**	**$9,102**	**$10,425**	**$6,438**	**$10,140**	**$21,300**

WxC 1000

		JUL	AUG	SEP	OCT	NOV	DEC
Revenue *(In Thousands)*	Actual	$2,184	$3,198	$3,892	$2,610	$4,030	$5,325
	Forecast	$1,613	$2,200	$2,513	$2,365	$3,000	$4,725
	Variance	$571	$998	$1,380	$245	$1,030	$600
	%	**135%**	**145%**	**155%**	**110%**	**134%**	**118%**

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FR: *Peter Cohen*

DT: *November 13th, 1989*

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WxC 2000

	JUL	AUG	SEP
Revenue *(In Thousands)*			
Actual	$8,400	$12,300	$13,900
Forecast	$6,453	$8,800	$10,050
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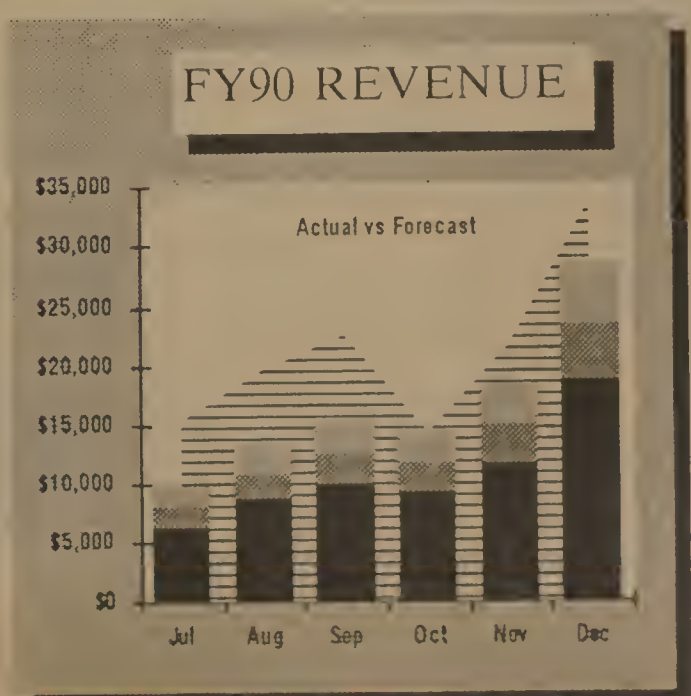

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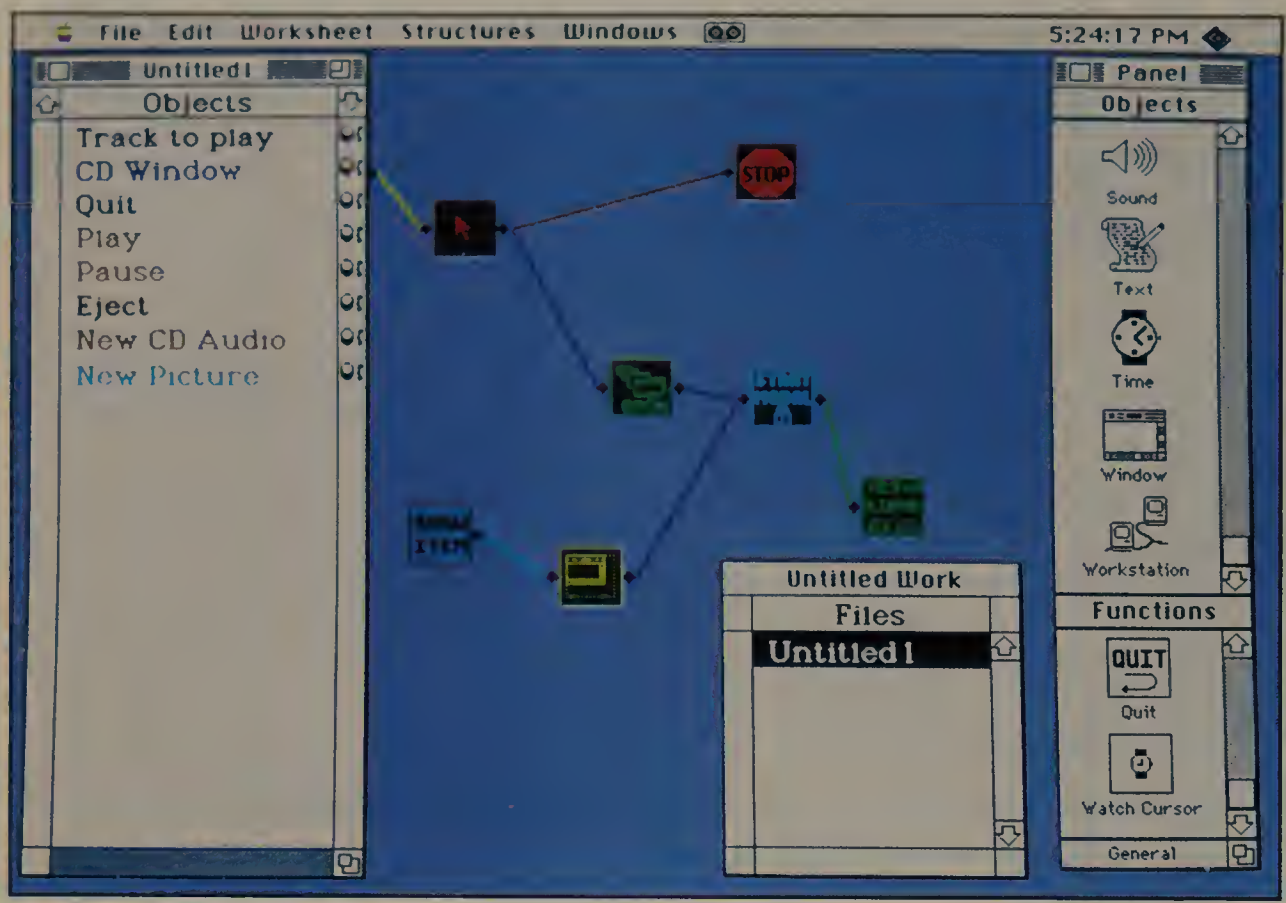

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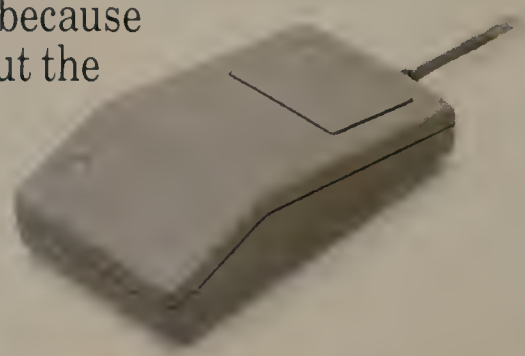

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MACWORLD NEWS

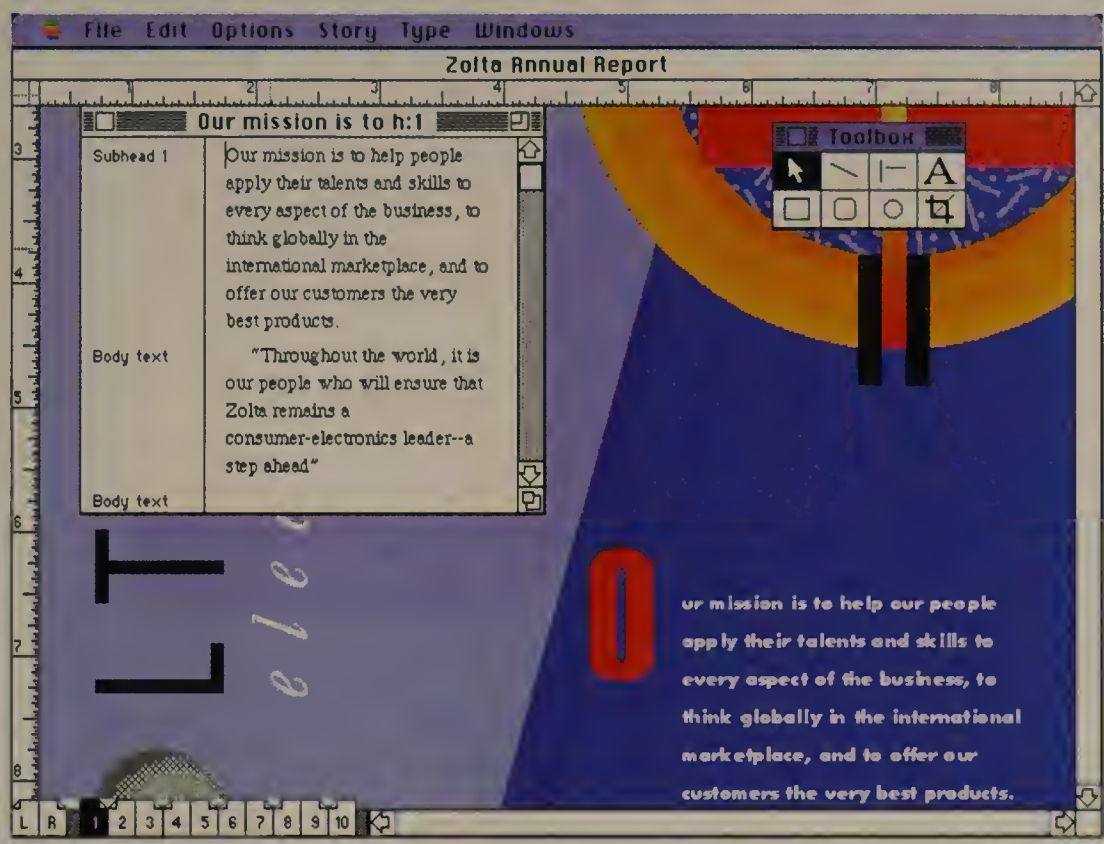
by Dan Littman and
Tom Moran

PageMaker Gets Simple

While PageMaker has remained simple and focused on page makeup through three generations, other layout packages have heaped bells on top of whistles, from spreadsheets to graphing to design by artificial intelligence.

PageMaker 4.0 at least partially closes the gap between page layout and document processing, adding—at last—a wealth of word processing capabilities. To avoid the complexity afflicting feature-laden products (and to save a few CPU cycles), PageMaker 4.0's Story Editor harks back to an earlier, simpler time, before the days of What You See Is What You Get. Double-clicking on a story in layout mode jumps you to a raw text-editor, where you can write stories; search and replace text; change fonts, character, and paragraph styles; and even check spelling. Style changes take effect back in layout mode. WYSIWYG or no, PageMaker 4.0's other document-processing features are impressive, including generating tables of contents and indexes three levels deep from multiple 999-page documents.

Version 4.0 adds greatly increased typographical capabilities, including manual kerning of letter pairs to 1/100 of an em space; tracking with five point-size-dependent settings (for Apple laser printers' standard fonts only—Aldus expects third parties to fill this gap for other fonts); the ability to condense or stretch type from 15 to 200 percent; support for 2- to 650-point type and leading in 1/10-point increments; tight control over paragraph breaks, widows, and orphans.



PageMaker 4.0's Story Editor is a streamlined text processor for writing and changing text. It offers a spelling checker and a search-and-replace function.

PageMaker 4.0 adds a link manager for keeping track of imported graphics, and Color Extension's color capabilities will also be incorporated in version 4.0.

The new version lacks some useful document processing features, including opening more than one document at a time and automatically tracking and numbering page jumps.

Pricing and an upgrade policy for PageMaker 4.0 were undecided at press time. For more information, contact Aldus in Seattle, Washington, at 206/622-5500.

—Dan Littman

The Worldwide Mailbox

Chances are good that half of your business card is dedicated to a list of your E-mail addresses. E-mail users have long been faced with a bewildering array of services that can't communicate with each other, but as more commercial services embrace the International Standards Organization's X.400 specifications, crossing boundaries between services is becoming less of a problem. AT&T Mail, MCI Mail, TeleMail, CompuServe, and GE Information Services are all offering some form of X.400 support, and some office E-mail systems now provide gateways to X.400 services, including QuickMail, Microsoft Mail, and RetixMail.

Unfortunately, you still have to remember the addresses on each system for everyone you want to send mail to. X.500 is a proposed worldwide specification for E-mail directory services, but it has yet to be implemented by any commercial service. When it is implemented, you'll be able to find anyone's E-mail address, anywhere in the world, as easily as calling local di-

(continues)

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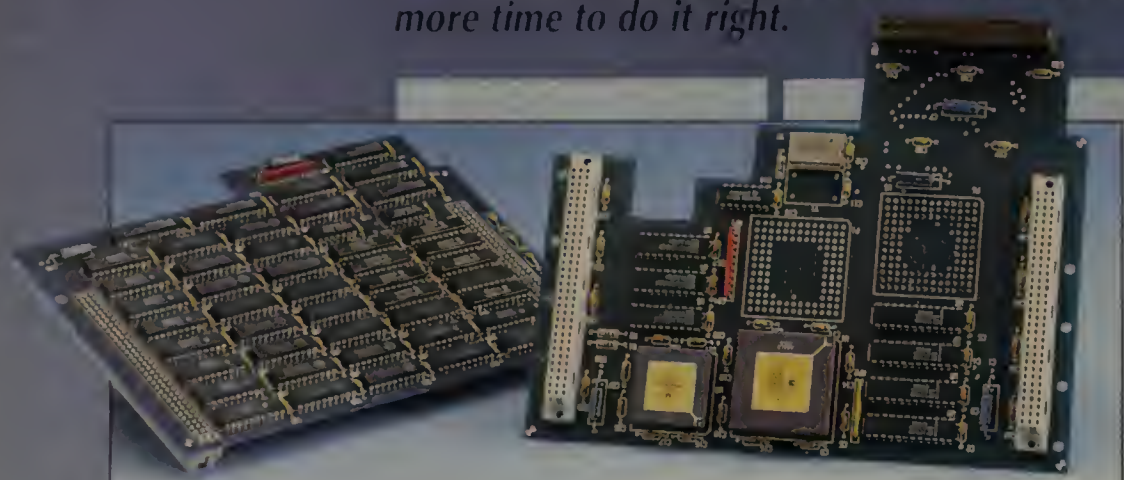

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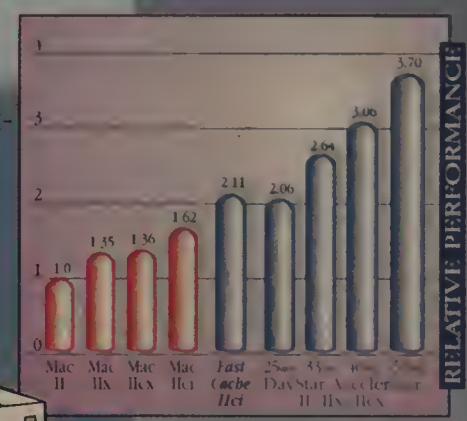

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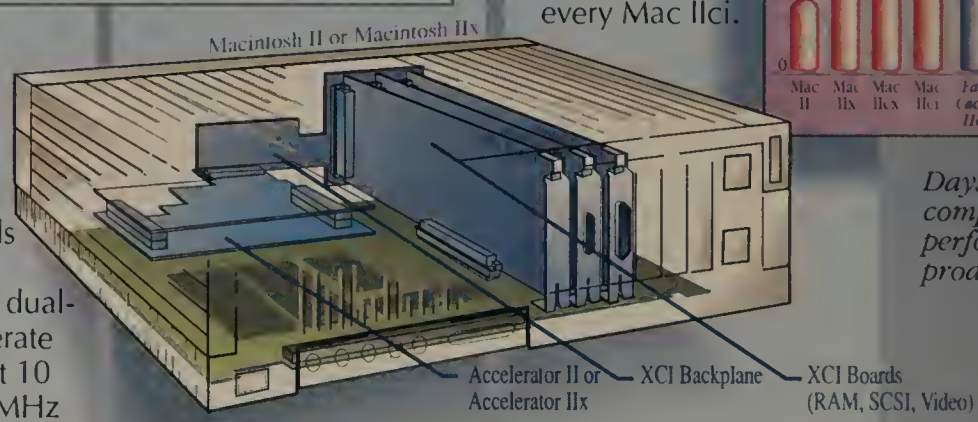

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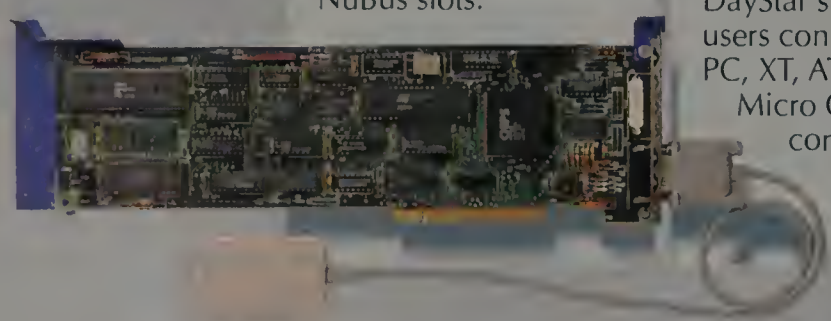

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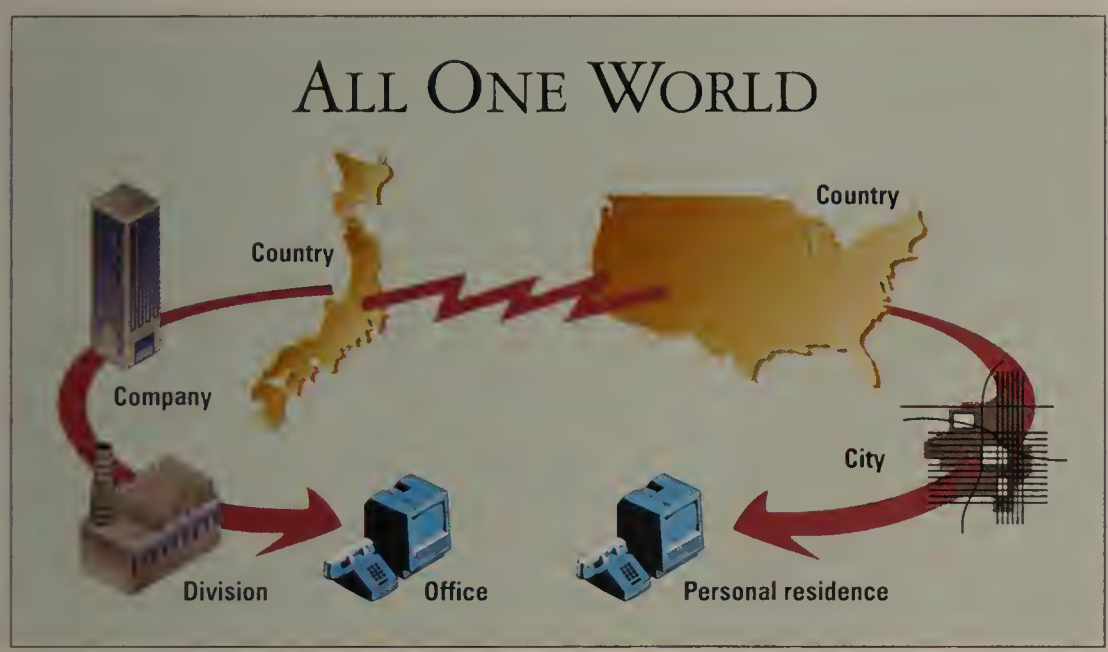
rectory assistance for a telephone number. For example, you'll be able to find the addresses of a chap whose last name is Wilson and who is listed as a computer programmer for TIC in Great Britain.

But the global aspects of X.500 directory services won't be limited to electronic mail. X.500 directories will be able to function like an international electronic version of the white pages and yellow pages, so that, for example, you'll be able to search for all the Jeep repair shops between Johannesburg and Cairo, and—using an ISDN-based phone—display directory entries on your phone. You will also be able to use X.500 to route faxes, and it will simplify electronic banking.

It may be a few years before all this comes to pass. Large-scale testing of a white-pages directory service is now under way in New York State, but moving beyond that to national and international listings of services will depend on each country's regulatory laws and the willingness of phone companies to share their listings. No tariffs have been set, but don't count on its being as inexpensive as a local phone call.

—Dave Kosiur

This point-and-click map provides basic information about countries for would-be beer exporters.



X.500 can potentially unify E-mail addresses and telephone directories worldwide—when politicians agree to let information flow without restrictions.

Putting the Professor on Disk

Northern Telecom executive Richard Oliver was teaching international marketing to Vanderbilt University graduate students when he abandoned his lecture on political risk analysis. "[Political risk analysis] was the most boring part of the global marketing class—and it should be the most interesting," Oliver said.

Oliver asked for help from Robert Duthie, a Nashville-area Authorware Professional developer, and the pair packed Oliver's knowledge of market-entry decision factors and political risk analysis into a 14MB application. The two-hour course replaces Oliver's lecture and leads students through the development of a global beer-export strategy with digitized photographs, full-color charts, text, and a point-and-click world map of economic and cultural information about 21 countries. The program winds up with a quiz whose results Oliver plans to incorporate in students' final grades.

Now Oliver's wife, an obstetric nurse, is planning an Authorware Professional application to teach pregnant teens about good prenatal care.

Authorware Professional, like its predecessor, Course of Action, is an application generator. Its underlying iconic programming environment gives you control of a vast set of multimedia tools. You can design graphics, create animations or import PICS-format files, and add sounds—it comes with a Farallon MacRecorder—

CLARK THOMAS

Vanderbilt University professor Richard Oliver prepares graduate students for their first all-Mac class.

and drive a video disk player. Its text-parsing and branching Response Analysis capabilities let you manage partially correct responses. Authorware Professional provides a wide range of functions and variables for handling numbers, dates, text, mouse clicks, logic, conditionals, and so on; the program also supports XFCNs, XCMDs, and compiled C or Pascal. Applications can be cut up and the chunks reused in various ways, from copying a graphic into another application to extracting an intelligent animated gauge and its link to a customized text-parser.

Authorware Professional sells for $8000 and is available only from Authorware. Authorware Academic, a version that lacks color, sound, and animation capabilities, is available to the academic community for $495. For more information or to contact Authorware developers, call Authorware in Minneapolis, Minnesota, at 612/921-8555.—**D.L.**

(continues)

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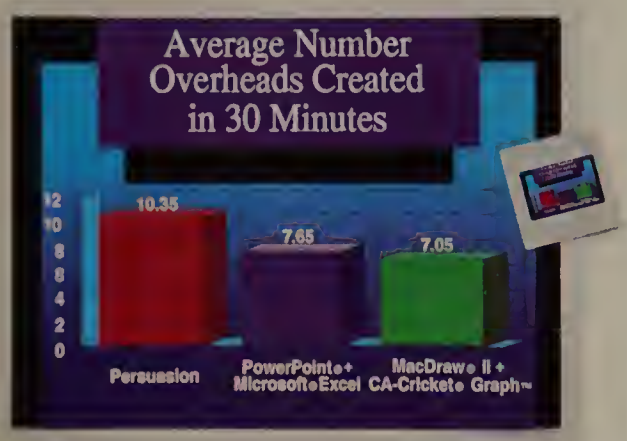

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Apple's First Multimedia Tutorial Teaches Network Troubleshooting

Apple has developed an interactive multimedia tutorial for AppleTalk administration and troubleshooting, a product that may be only the company's first of many interactive tutorials on a variety of subjects. Currently in use inside Apple, the program is now also offered to Apple's resellers, and an end-user version is under consideration.

Called Network Administration Skills Courseware (NASC), the tutorial includes overviews and maps of the course structure. It provides live-action introductions to each topic as well as in-depth instruction, examples, short quizzes, gauges of learning, and problem-solving exercises. Advanced students take challenge tests to move up to more difficult topics. The course resides on both sides of a single laserdisk, and uses HyperCard 1.2.2 to navigate the extensive video instruction and other screens.

The networking instruction is organized in modular topics including Apple LAN Literacy, AppleTalk Network Products, Apple in SNA Environments, Apple in the DEC Environment, Supporting Network Solutions, Selling Network Solutions, and Designing Network Solutions. Apple said it is working on other skills-based, non-product-specific training programs.

Requirements for using NASC are a laserdisk player, HyperCard 1.2.2, and a Mac II–series system. The tutorial is available as a course to be taken, but is not currently available as a product to be purchased. No price for the course had been set at press time. For more information, resellers should contact Apple regional training managers.
—Tom Moran

Apple's interactive tutorial uses HyperCard 1.2.2 and extensive maps to guide network administrators and others through a number of related topics.

Hayes Rolls Out 9600-bps Modems

Hayes has unveiled its V-series Ultra Smartmodem 9600, a 9600-bps (bits per second) modem with compression algorithms supporting communications at up to 38.4kbps (kilobits per second). Called Ultra 96 for short, the modem supports full duplex, dial-up communication with a wide variety of modems using a wide variety of CCITT standards.

The 38.4kbps data-transfer rate is achieved by the modem's V.42bis data compression, the latest CCITT standard. To remain compatible with data-compression standards currently in wider use, Hayes included Hayes Adaptive Data Compression and MNP Class 5 data compression on the Ultra 96. The modem automatically chooses the most efficient compression method that is available to both the sender and receiver.

PIERRE YVES GOAVEC

The Hayes V-series Ultra Smartmodem offers many compression protocols and algorithms.

Because Hayes intends to distribute the same model of the Ultra 96 worldwide, the device also incorporates V.32, V.21, V.22, V.22bis, and V.23, which are error-checking and data-compression algorithms used by various existing modems. Hayes also included 103, 212A, and the Hayes V-series 9600 ping-pong protocol for 9600 bps and 19.2 kbps data-transfer rates.

The company also introduced the Hayes V-series Smartmodem 2400M, an internal 2400-bps modem for the Mac II line. The Smartmodem 2400M complies with CCITT V.42bis, V.22bis, and V.22 protocols for up to 9600 bps, and is backwards-compatible with 103 and 212A protocols, supporting data-transfer rates of 300 bps, 1200 bps, and 2400 bps. It also includes Hayes Adaptive Data Compression and MNP Class 5 data compression.

The V-series Smartmodem 2400 was slated to ship in January at an estimated retail price of $699. The V-series Ultra Smartmodem 9600 should begin shipping in the first quarter of 1990 at an estimated retail price of $1199. For more information, call Hayes in Atlanta, Georgia, at 404/441-1617.**—T.M.**

NECT Color Printer Does PostScript

NEC Technologies recently unveiled its ColorMate PS, a color PostScript printer that uses thermal-transfer technology. The printer uses a four-color ribbon to pro-

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duce up to 16.7 million colors at 300-by-300-dpi resolution.

Intended for high-end graphics, CAD/CAM, and similar applications, the ColorMate PS includes Adobe PostScript and offers a simulated Pantone Color Pallette licensed by Pantone for color matching. The ColorMate PS can print on letter or A-size paper or, with an optional $995 20MB hard disk, on legal-size paper. The printer can also handle transparencies. A typical 8-by-9-inch image prints in less than a minute, while a monochrome image that size would take less than 20 seconds, according to NECT.

PIERRE-YVES GOAVEC

NECT's ColorMate PS color printer creates PostScript output on letter- or legal-size paper.

The ColorMate PS includes 8MB of RAM, 35 resident fonts, a LocalTalk/AppleTalk connector, a parallel port, a SCSI port for the optional hard disk, and a combination RS-232C/RS-422 serial port. The device accepts three-color and monochrome ribbons.

The ColorMate PS has a suggested retail price of $9995, and was expected to begin shipping in December 1989. For more information, call NECT in Boxborough, Massachusetts, at 508/264-8000.—**T.M.**

MacProff: Macs Yak with Mainframes

HyperCard has found a new avocation interpreting the mumbo jumbo of computers talking to each other. Two examples: Oracle for the Mac uses HyperCard to pass SQL statements, and MitemView uses HyperCard as a sort of roll-your-own interface that listens to other computers and learns their dialect.

Now Mariette Systems' MacProff is using HyperCard to plug Macs into PROFS, the feature-rich but not-so-friendly E-mail system that is standard on IBM mainframes. MacProff duplicates PROFS's features in HyperCard while requiring no changes to the mainframe's configuration.

Getting Macs to appear as 3270 terminals to an IBM mainframe requires substituting a board or a gateway for a cluster controller, and the three cluster controller substitutes available—Avatar's MacMainFrame, DCA's MacIrma, and Tri-Data's NetWay—come with application programming interfaces (APIs) to use in Mac applications once the machines are talking. MacProff translates between the APIs and HyperTalk, letting HyperCard buttons send PROFS function keys to the mainframe; or combining pages of PROFS text, which are limited to 22 lines, into one Mac-like scrolling field in HyperCard, and then breaking the scrolling text up into PROFS pages as it goes back to the mainframe.

DRAKE SOREY

Lockheed's Andrew Block has been testing MacProff's ability to let Mac users into Lockheed's E-mail.

At Lockheed's Data Systems Administration in Sunnyvale, California, Andrew Block is completing a satisfactory beta-test of MacProff on a Mac IIx connected via MacMainFrame to an IBM 3093. He says that worldwide, Lockheed has stopped buying 3270 terminals and is buying mostly Macs, but "PROFS is our E-mail standard worldwide, so every machine will have to use it." Perhaps someday mainframe computers will disappear entirely, and when that happens, to preserve huge investments in mainframe software like PROFS, someone will have to create a virtual mainframe for desktop computers—in HyperCard, no doubt.

MacProff costs $195.99 per Mac. For more information contact Mariette Systems in San Mateo, California, at 415/344-1519.—**D.L.**

Motorola's 68040 Boasts 19 MIPS

In late January Motorola introduced its much-anticipated 68040, a microprocessor likely to be the heart of future Macintoshes running at 19 MIPS (million instructions per second) and beyond. At press time, the company said it would begin shipping samples by the end of 1989, with volume production expected by the second quarter. Motorola stated that it would take three to six months for engineers familiar with the 68000 family to design and produce a system based on the new processor. Design for the main logic board might take as little as ten working days for a team of experienced 68030 designers.

Motorola squeezed 1.2 million transistors into the 68040, making it the most densely integrated microprocessor by a narrow margin over Intel's top-of-the-line 80486. Like the 486, the 68040 boasts what is called a Harvard Architecture, which means it has two separate caches (fast-access storage areas in RAM), one for data and one for instructions. Compared to the 68030, which has one PMMU (paged memory management unit) for caching both data and instructions, the 68040 has

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two PMMU's and boasts much larger caches. The new processor is 100 percent compatible with all 68000 family software, Motorola says.

The 19-to-21-MIPS performance cited by Motorola is for 68040s running at the initial clock speed of 25MHz. The company expects to introduce faster versions at unspecified later dates. Current versions of the 68030 run at speeds ranging from 16MHz to 50MHz, with respective performance ranging from 5 MIPS to 12 MIPS. A 40MHz 68040 would run at about 29 MIPS, according to Motorola. However, that big an increase in clock speed may take several years.

The 68040 also shines in floating-point math operations, essential to the speed of scientific, CAD, and graphics applications. The 25MHz 68040 provides 3.5 MFLOPS (million floating-point operations per second), while a 50MHz 68030 operates at only 0.5 MFLOPS. The 68040 is therefore unlikely to require an expensive math coprocessor.

The 68040's performance will not come cheap at first. Initial prices are expected to range between $700 and $800 to manufacturers, which typically translates into about $1400 to $2400 in end-user cost for the processor alone. However, if the price follows the typical curve for top-selling microprocessors, it should drop to half that or less within one to two years. **—T.M.**

STEVEN PUMPHREY

The 68040 design team: (front row, clockwise from left) Ashok Someshwar, Steve McMahan, Beverley Vann, Denise Clark, Van Shahan, Bill Ledbetter; (middle row) Mike Gallup, Renny Eisele, Robin Edenfield, Eric Quintana, Ken Scheuer, Chris Allen, Jose Guzman, Lal Sood; (back row) Kirk Holden, Ralph McGarity, Geno Browning, Russ Reininger, Chris DeWitt.

Full Impact's Second Round

Version 2.0 of the graphical spreadsheet Full Impact is in the hands of beta testers. Its most notable new features are buttons, which you create by attaching a macro to just about any selectable object in a worksheet; and full three-dimensional graphs, which you can drag on the worksheet to set their perspective and angle.

One sample worksheet, using macros behind buttons and other Mac interface objects, looks like a checkbook and acts like a Mac application. A click on an arrow that conceals a button triggers a macro that advances through your check register; another button's macro pops up a menu for assigning transactions as deposits, ATM withdrawals, or other operations. The 2.0 package will provide a button-maker utility to help nonprogrammers get started with buttons.

In version 2.0, you can modify ⌘-key equivalents for menu items; modify number formats as in Excel; control borders separately for each side of a cell; align objects by using snap to grid or an alignment dialog box; search and replace for text in macros; and lock macros. There is a new Resource Tools dialog box, similar to Font/DA Mover, for moving macros, sounds, custom dialog boxes, and other resources.

Finally, Full Impact 2.0 imports Excel 1.5 and imports and exports Excel 2.2 in native format, including formulas and macros (though imported macros may need some tweaking). Unfortunately, version 2.0 still has only eight basic colors, and Print Preview is still implemented as a separate utility.

Full Impact 2.0 will probably be available at the April Macworld Expo. No pricing informations was available at press time. For more information, contact Ashton-Tate in Torrance, California, at 213/329-8000.**—D.L.**

Kodak Brings Out Portable Printer

Intended for use with the Macintosh Portable or with any Mac, the Kodak Diconix M150 Plus is a battery-powered printer that weighs 3.1 pounds. The M150 Plus is faster than the existing M150 because it prints bidirectionally. It has a fast-draft mode at 96 by 96 dpi, an NLQ mode at 192 by 192 dpi, and a quality mode that prints at 192 by 192 dpi but makes two passes for better final output.

The ink-jet printer uses an easy-to-replace modular print head and ink supply. The printer includes 13 Adobe Type Manager outline fonts, prints on plain paper, and runs on AC power. When away from AC power, the M150 Plus requires standard C-size NiCad batteries. It can handle either continuous form paper or single sheets.

The M150 Plus has a suggested retail price of $699, and the company

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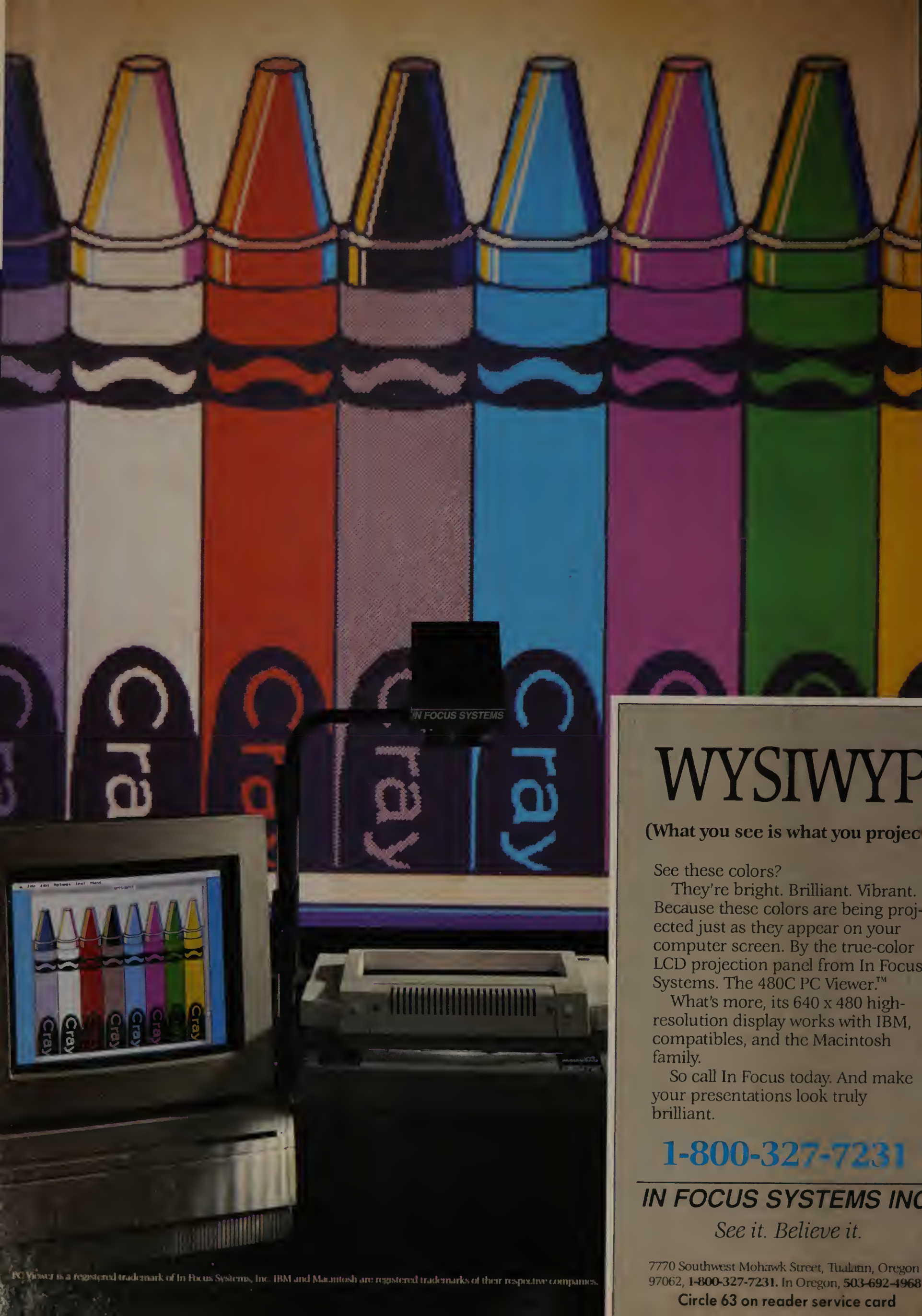

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PIERRE-YVES GOAVEC

The Kodak Diconix M150 Plus bidirectional portable printer is battery powered and weighs 3.1 pounds.

expected to begin shipping the printer in January. It comes with a printer cable, an AC adapter, and one print head; and the M150 Plus requires 1MB of RAM and System 6.0.2. For more information, call Kodak in Rochester, New York, at 800/255-3434.—**T.M.**

EtherNext Connects NuBus to Twisted-Pair Ethernet

NetWorth has introduced its EtherNext for the Mac II, a NuBus board that provides relatively inexpensive access to Ethernet via standard twisted-pair wires. Twisted-pair wires are less expensive and easier to install than other cabling systems for Ethernet. If extra telephone wires are already installed in a building, users can simply change the standard RJ-11 phone connectors to RJ-45 jacks and use those wires for Ethernet.

EtherNext is compatible with the usual baseband Ethernet and can use all the same software, the company says. EtherNext is intended for the entire Mac II series.

The EtherNext board provides a data-transfer rate of 10 megabits per second over the twisted-pair wires. A bidirectional data buffer gives the board a theoretical transfer rate across NuBus of 12MB per second, but NuBus limits the practical rate to about half that speed, according to NetWorth.

Although the IEEE has not completely finished approving the proposed twisted-pair Ethernet standard, called 10base T, NetWorth guarantees that EtherNext will comply with the final specification. The company will provide a free upgrade if technical changes are made in the final 10base T version.

EtherNext's suggested list price is $725. The board was scheduled to begin shipping near the end of January. For more information, call NetWorth in Dallas, Texas, at 214/869-1331.—**T.M.**

Lost and Found

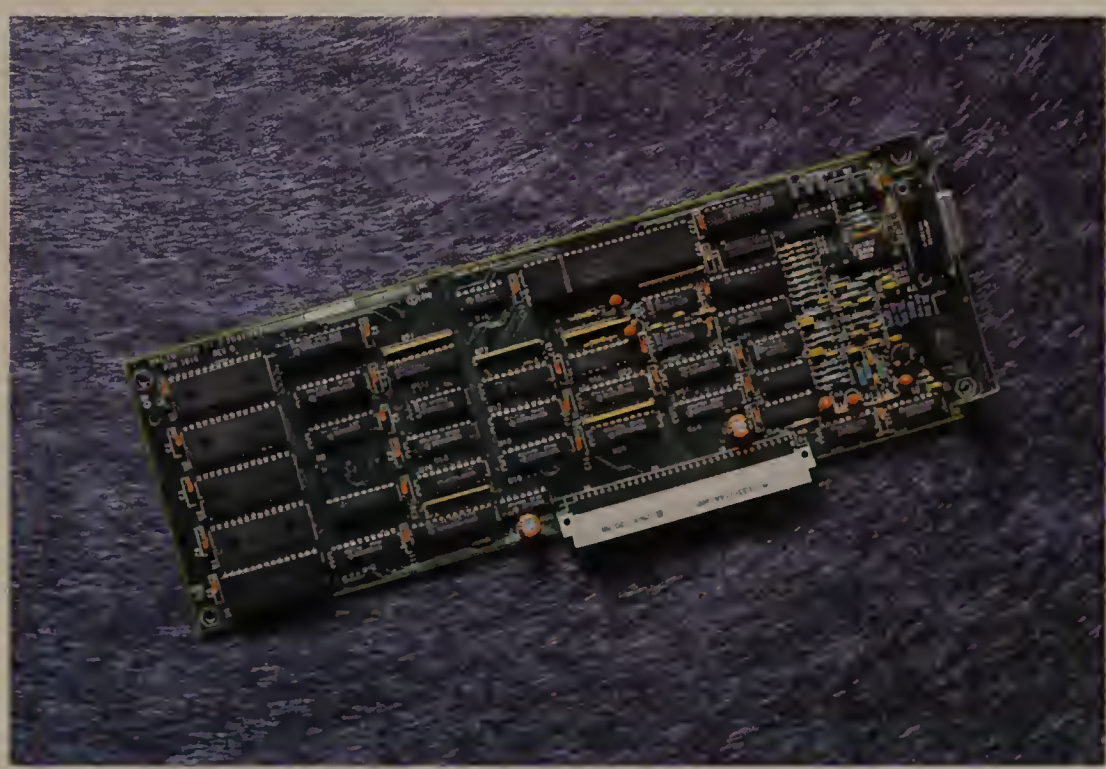
After the omnibus Jazz was wrecked upon the shoals of the Mac community's unpredictable taste, Lotus Development founder and 1-2-3 architect Mitch Kapor left to start On Technology and do the Mac right. Now the company is about to deliver its first product, a stripped-down search-and-retrieval engine with a few new twists.

On Location (OL) is a DA/INIT combination. It enables you to find any text on a hard disk, and special translators display finds as they would appear under the application that created them. Besides the translators, OL differs from other search utilities, such as Gofer and Sonar, in some significant ways.

Unlike Gofer, OL works by maintaining an index of a hard disk, resulting in much faster search speeds, and it can use file names as a search criterion. OL creates a single index file for a whole disk, whereas Sonar puts indexes in every folder and subfolder. And while the On Location index takes up only 2 percent of a hard disk, Sonar indexes can outgrow data files. You can copy and search an OL index even when the indexed disk is not attached. On Location's initial indexing process is much faster than Sonar's—On Technology estimates it takes a half hour to index an 80MB hard disk—and OL updates its index in the background as you create files or save changes. However, OL offers none of Gofer's, and especially Sonar's, sophisticated features, which range from Booleans and searching by proximity, to wild cards, relationals, and interruptions and subsearches.

Until DataViz, which developed the filters OL uses, completes a filter for Excel, OL will not display Excel finds in the proper format. AppleShare vol-

(continues)



PIERRE-YVES GOAVEC

NetWorth's EtherNext for the Mac II family is a NuBus board that connects to Ethernet over standard twisted-pair lines, reducing cabling costs.

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Circle 281 on reader service card

SETH RESNICK

Lotus founder Mitch Kapor and the Boston skyline. Kapor's new company, On Technology, is ready to ship Mac products.

umes also present a curious problem: OL indexes don't respect AppleShare's security features, so you can't prevent users from finding text in folders they are not authorized to read. On Technology plans a fix for a later version. On Location will list for $129.95. For more information, contact On Technology in Cambridge, Massachusetts, at 617/225-2545.—**D.L.**

One Word Fills Volumes

There are now at least nine hefty volumes that supplement Microsoft Word 4.0's documentation, each steering the user through Word's intricacies with a different approach. Surprisingly, these books don't outshine Microsoft's manual, but they provide many extras, including chapter summaries, cross-referencing, expanded tutorials, charts of Word's icons, explanations of Word's special characters, and information for power users.

The books fall into two major categories: how-to beginners' guides emphasizing word processing basics, and advanced guides covering Word's features and options exhaustively. While a few books offer a succinct chapter on Word 4.0's new features, none of the books are geared toward people already familiar with version 3.0.

Several books, including *Mastering MS Word 4.0* and *Microsoft Word Made Easy, Version 4*, are organized by feature almost as if you were scrolling across Word's menus. Other books, such as *Using Microsoft Word 4* and *Working with Word: The Definitive Guide*, are task oriented, with projects that teach you everything from outlining to indexing. *Desktop Publishing with Microsoft Word* has a unique focus on Word 4.0's page-layout and design capabilities.

My personal favorites are two nearly encyclopedic volumes, *Word 4 Companion* and *Working with Word*, both of which cover everything. *Word 4 Companion* also has the cleanest design, while *Working with Word* edges out the others with its clarity and useful power tips.

If you jumped from Word 3.0 to 4.0 without cracking open the manual, here's a word to the wise: there are far more changes than is apparent at first glance, and reading one or two of these books will really pay off.

—**Barbara Tannenbaum**

TOPS Brings Out InBox 3.0, Adds Gateways

An easier-to-use version of InBox that will link via gateways to other mail systems was recently introduced by the TOPS division of Sun Microsystems. Called InBox 3.0, the software is also compatible with network operating systems such as AppleShare, Novell Netware, 3Com's 3+, LanManager, and TOPS Mac. InBox 3.0 runs over AppleTalk networks without network file-sharing software.

InBox 3.0 comes with two versions of the software, one for the Mac and the other for the PC. Either PCs or

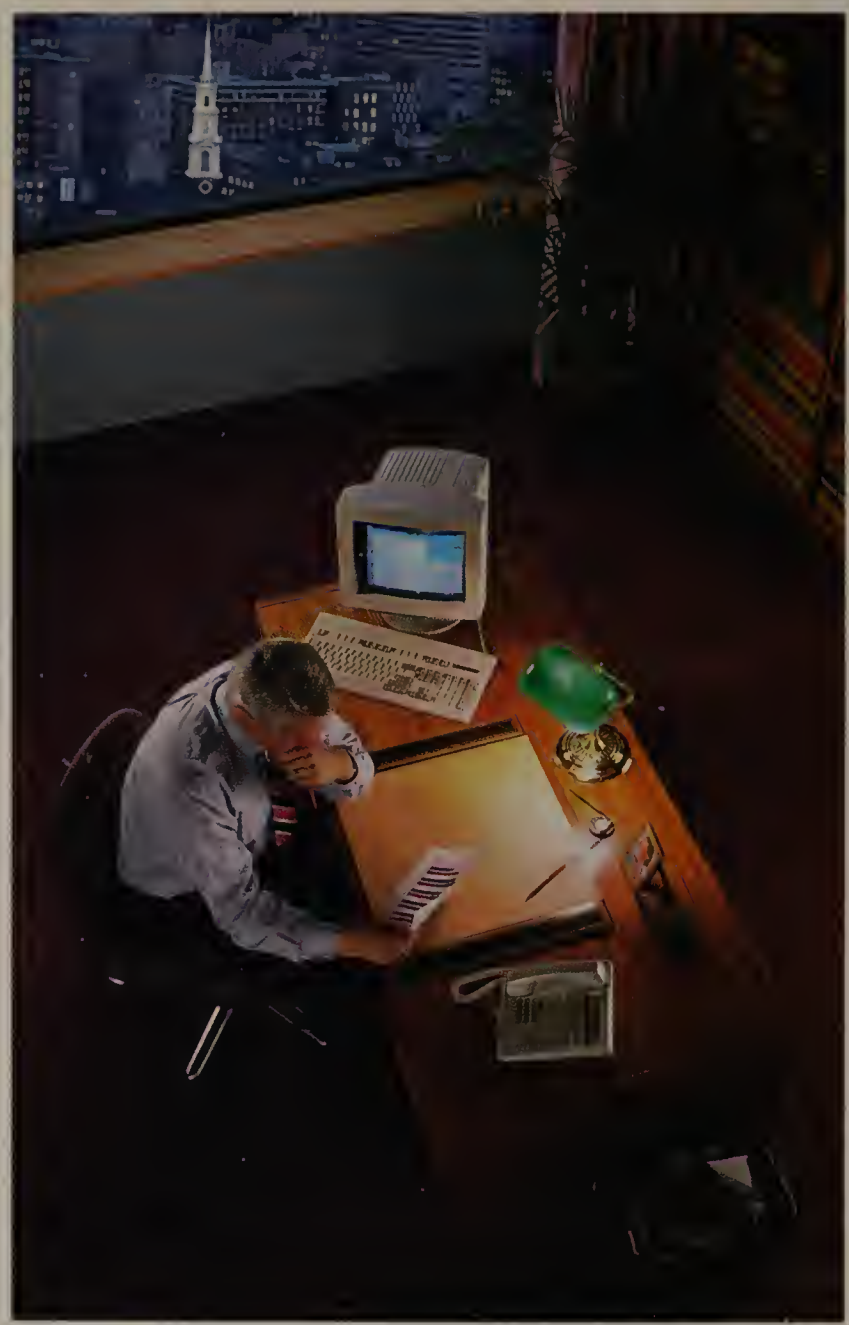
(continues)

NINE BOOKS ON MICROSOFT WORD 4.0

Title	Desktop Publishing with Microsoft Word[1]	Expert Advisor: Microsoft Word 4.0[2]	Mastering Microsoft Word[3]	Mastering MS Word 4.0[4]	Microsoft Word Made Easy[5]	Understanding Microsoft Word 4[6]	Using Microsoft Word 4[7]	Word 4 Companion[8]	Working with Word: The Definitive Guide[9]
Orientation									
Beginning			•		•	•			
Advanced	•	•		•			•	•	•
Organization									
Alphabetical		•							
By menu				•	•	•		•	
By project	•		•				•		•
Design									
Chapter summaries	•		•		•	•	•	•	•
Cross referencing	•	•						•	
Tutorials				•	•	•			•
Glossary		•	•	•	•	•	•	•	•
Subjects Covered									
AutoMac			•	•		•	•	•	•
Desktop publishing	•	•		•		•	•		•
Mathematical typesetting	•	•		•			•	•	•
Microsoft Mail				•			•	•	•
PostScript	•	•		•			•	•	•
Word Finder			•	•	•		•	•	
Charts									
Keyboard shortcuts		•	•	•	•	•	•	•	•
Special characters		•	•	•		•	•	•	•
4.0 icons		•	•		•	•		•	•
Preset defaults									•

[1] By Tim Erickson and William Finzer. Sybex, 1989; $24.95. [2] By Paul E. Hoffman. Addison-Wesley, 1989; $19.95. [3] By Michael J. Young. Sybex, 1989; $22.95. [4] By Pamela S. Beason. Bantam, 1989; $21.95. [5] By Paul Hoffman. Osborne McGraw-Hill, 1989; $19.95. [6] By Richard Swadley. Sams, 1989; $18.95. [7] By Bryan Pfaffenberger. Que, 1989; $21.95. [8] By Gena B. Cobb, Allan McGuffey, and Judy Mynhier. The Cobb Group, 1989, $22.95. [9] By Chris Kinata and Gordon McComb. Microsoft Press, 1989; $21.95.

If time is money, why is there no accounting for it?



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BOB HOLMGREN

To make InBox 3.0 easier to use in mixed environments, TOPS programmers designed the program to have nearly identical interfaces on the Mac and on IBM PCs and compatibles.

Macs can act as file servers for both types of machines on the same network. The interfaces on the two types of machines are extremely similar, meaning that users need not learn a whole new package if they change systems or are away from their desks but want to send a message.

The standard InBox 3.0 package supports up to 20 users. Users can store permanent personal address books; attach multiple files to messages; and sort mail by date, subject, or sender. Users can also store messages in "storage boxes" on their own hard disks, which tends to ease the burden on a central server.

TOPS also introduced InBox Plus, which has the same features as InBox 3.0 but allows for multiple message centers, gives users access to other services through gateways, and supports up to 100 users per message center. The gateways are being developed by third-party vendors. Different versions of InBox Plus can reside on a Macintosh, a PC, a VAX, or a UNIX system.

InBox 3.0 has a suggested retail price of $329 for 20 users. The suggested retail price for InBox Plus is $995 for up to 100 users. Both products were scheduled to be available in January. For more information, call TOPS in Alameda, California, at 415/769-9669.
—T.M.

Observing an Oracle Database

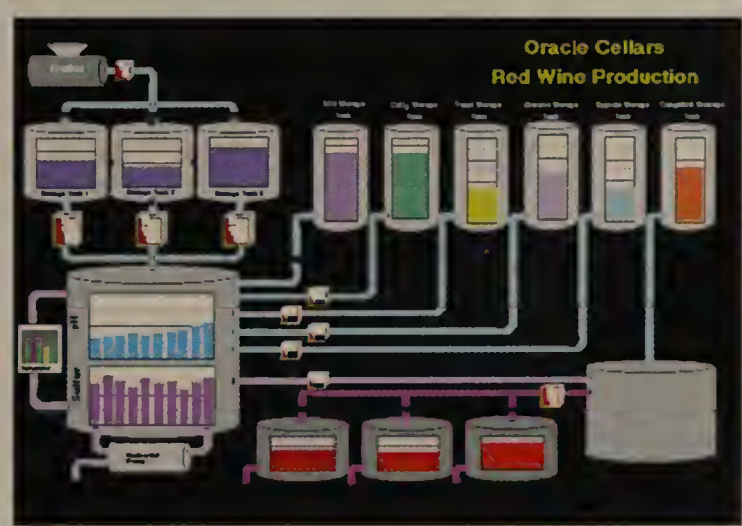
To its tools for gathering and manipulating data, Oracle is adding a tool for displaying data in a wide variety of live charts and graphs. Oracle Graphics is designed to maintain links to an SQL database, constantly updating what Oracle calls animated pictures—schematics with embedded or underlying graphs—as the conditions recorded in a database change.

For example, an application developed at Oracle's offices depicts a full-color illustration of a winery. Each vat on the winery floor is monitored with sensors that feed data about temperature and chemical conditions to the database, and Oracle Graphics uses dynamic object linking, to make thermometers and gauges in the illustration rise and fall with the wine's condition. Illustrations can be imported as PICT, EPS, and other formats, or you can create them with Oracle Graphics' tool palette.

More examples: Hospital nurses could fill out patients' charts on a VAX terminal, while a doctor at a Macintosh could click through vital stats for each patient on an anatomical chart showing human organs and skeletal, vascular, and nervous systems. Or a taxi dispatcher could glance at a digitized map of a city to find out how many cabs are in a particular neighborhood and, perhaps by their color, how long each cab will be busy or where it is headed. Oracle Graphics' updating is limited to about once every five seconds, however, making it unsuited for certain real-time applications.

Oracle Graphics provides 51 standard graphs in 9 types (column, line, bar, mixed column and line, pie, double-*y*, high-low, scatter plot, and tables of columnar data). You can modify tick marks, labels, and other elements; or with dynamic object linking, create animated pictures that do away with traditional graphs entirely. Building a graphing application requires writing SQL statements, though other Oracle products being ported to the Mac will make the process more accessible. In the meantime, developers can create flexible templates that give end users some control over a graph.

Oracle Graphics will run on all Oracle platforms and share data in standard SQL fashion. Pricing for the product was undecided at press time. For more information, contact Oracle in Belmont, California, at 415/598-8000.
—D.L.



In this mock-up of a winery, instruments pass data about each process to an SQL database, which then sends it to an Oracle Graphics window for live graphing.

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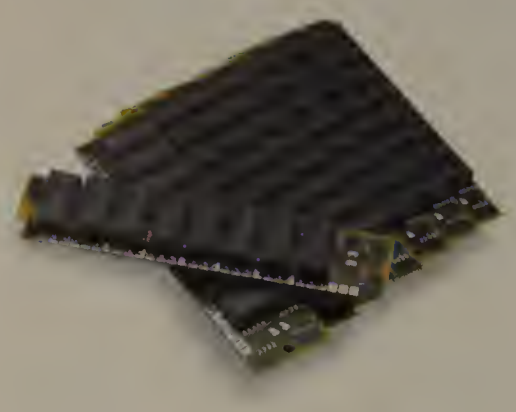

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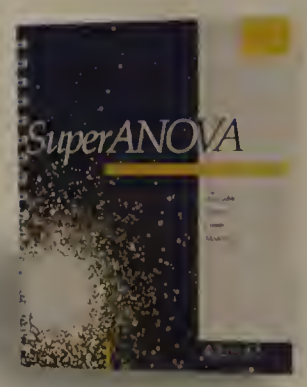

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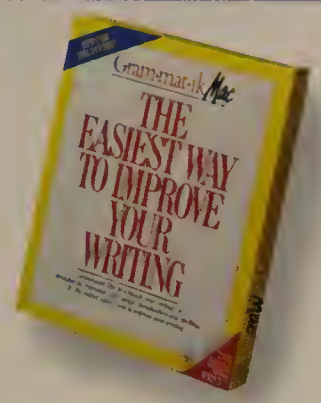

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On the Ethernet Highway

Macworld Labs tests Ethernet interfaces for the Mac

Ethernet has become a viable alternative to LocalTalk. Why? First, there's Ethernet's speed of 10-megabits per second. Users who transfer large page-layout, graphics, and CAD files or who work with multiuser databases need something that provides better network performance than 230-kilobits-per-second LocalTalk.

Second, there's connectivity. Ethernet is the most popular medium for networking UNIX workstations, IBM PCs, and Digital Equipment Corporation VAX computers. Putting Macs on Ethernet means they can access information on those other computers. Finally, there's convenience. Because of its popularity, many corporations already have Ethernet installed. So it makes sense to use the same Ethernet cable to connect the Macs as well.

A number of devices are now available to link Macs to Ethernet. In fact, if you read "Network Connections" (*Macworld,* November 1989), you saw that the table of Ethernet interfaces took up almost a whole page!

In our tests, we wanted to determine which of those interfaces offered the best performance. We decided to concentrate on testing the Ethernet products that provided the fastest throughput to an individual Mac: add-in boards for the Mac SE, SE/30, and Mac II family, and external SCSI-based devices (see "Ethernet Interfaces").

We considered LocalTalk to be the bottleneck in data transfers to Ethernet. Therefore, we excluded LocalTalk-to-Ethernet routers, such as the Kinetics FastPath and the Cayman Systems GatorBox, from our tests. Those boxes provide Ethernet access to support Macintoshes on a LocalTalk network.

We also wanted to find out what kind of performance to expect from an Ethernet network. Very few computers can actually process data fast enough to saturate Ethernet's full bandwidth. (Take, for example, the fact that Ethernet's speed is on the order of the Mac's microprocessor and bus speeds.) This meant we had to test various network

by Dave Kosiur

hardware configurations, as well as investigate performance bottlenecks in the Mac itself.

Connecting to Ethernet

Currently four types of media can connect Ethernet networks: thick-wire coaxial cable, thin-wire coaxial cable, twisted-pair cable, and fiber-optic cable.

Thick-wire coaxial cable is best used as a network backbone linking several workgroups, not necessarily individual Macs. To attach a Mac to thick-wire Ethernet, you need a separate transceiver and a cable to connect the Mac's Ethernet interface to that transceiver; the transceiver then connects to thick-wire Ethernet via a *tap*. The cable itself measures a little less than 1/2 inch in diameter and is very inflexible. Thick-wire coaxial cable must be laid out in segments no longer than 500 meters. Each segment supports up to 100 nodes. (You can use *repeaters* or *concentrators* to join the cable segments and form larger networks.)

On the other hand, thin-wire Ethernet—nicknamed CheaperNet—is very popular for creating a workgroup from individual Macs. Thin-wire Ethernet is more flexible, less obtrusive, and less expensive than thick-wire Ethernet. There's no need for large external transceivers and taps. All Mac-Ethernet interfaces have thin-wire transceivers built in. A thin-wire Ethernet segment has maximum limits of 189 meters and 30 nodes.

An even more appealing way to create Mac workgroups is twisted-pair Ethernet, which uses telephone wire. Due to electrical considerations, most twisted-pair lengths are limited to 100 meters. Be forewarned, though: twisted-pair Ethernet isn't the same as Farallon's PhoneNet. PhoneNet requires only a single pair of wires—it can run over either flat modular phone cable or the regular premises wiring found in most buildings. Twisted-pair Ethernet requires two pairs of wires and must run over regular premises wiring. Farallon and NuvoTech now offer star controllers for twisted-pair Ethernet networks; Kinetics has two add-in boards, the EtherPort IIL and EtherPort SEL, that support twisted-pair Ethernet on the Mac II family and the SE, respectively. NetWorth has also announced EtherNext, a twisted-pair Ethernet interface board for the Mac II family.

PIERRE YVES GOAVEC

Add-in boards such as Asante's MacCon SE30/E (above) provide Ethernet access to Macs with internal expansion slots.

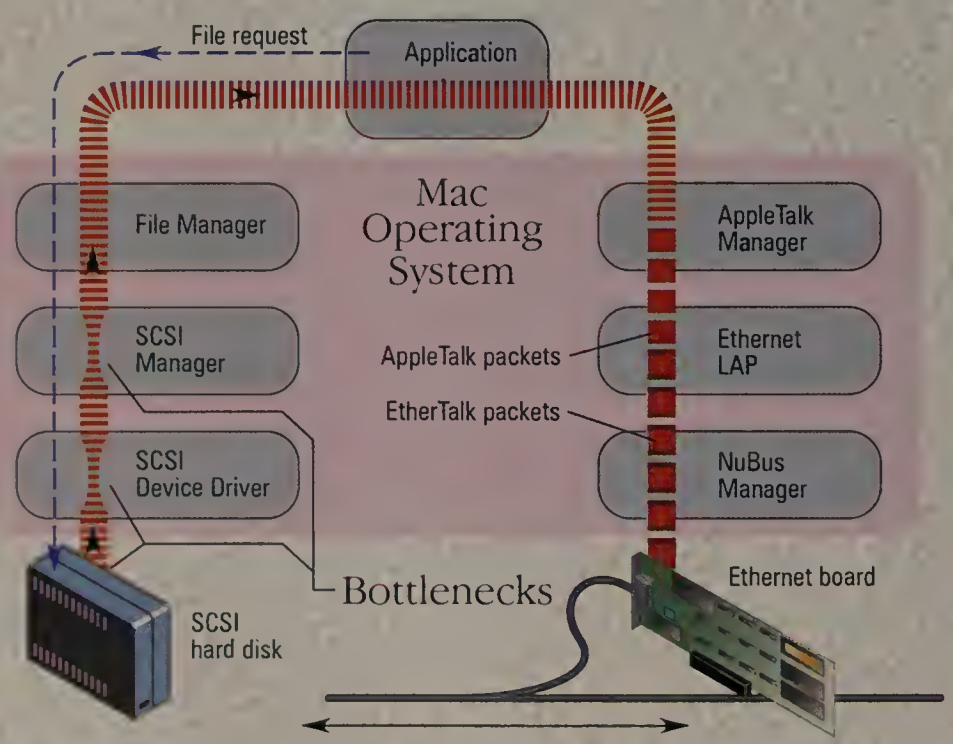
Fiber-optic cable is most often used for networks that need a high-security Ethernet backbone—high security, because it's difficult to tap into fiber-optic cable and intercept signals. In addition, fiber-optic cable is immune to electromagnetic interference (EMI). Macs do not ordinarily attach directly to fiber-optic Ethernet cable. The only Mac-Ethernet interface that currently supports fiber-optic cable is Network Resources' Mac2000 board, with optional fiber-optic adapter.

How Fast Is Fast?

Ethernet is 43 times faster than LocalTalk. Unfortunately, a Mac cannot process Ethernet data 43 times faster than it can process LocalTalk data. We tried to isolate the bottlenecks that prevent the Mac from keeping up with Ethernet's 10-megabits-per-second speed.

To determine how each step of the data-transfer process affects Ethernet

Moving Along



To understand where the bottlenecks occur in transferring data from the Mac to Ethernet, you have to examine how data gets from a Mac's hard disk onto Ethernet. As an example, here's what happens when you send a local file on a Mac II over the Ethernet network with AppleTalk protocols. When you select a file, the File Manager in the Mac Operating System asks the SCSI Manager—also part of the Mac Operating System—for the data (the file). The SCSI Manager sends the request to the SCSI Device Driver for the SCSI hard disk, which, in turn, instructs the hard disk to find and retrieve the data. Once the hard disk retrieves the data, it sends the data to the Mac's central processing unit (CPU). The CPU creates AppleTalk packets for the data and then directs those packets to EtherTalk's LAP (Link Access Protocol). After that the NuBus Manager in the Mac Operating System steers the packets over the NuBus in the Mac to the Ethernet interface board. Then the interface board takes over. It turns the EtherTalk packets into electrical signals that can be sent over Ethernet. Finally, the Ethernet board transmits the file as a series of Ethernet packets.

transfers, we tested various combinations of hard disks, RAM disks, and SCSI accelerators. Fast and slow disks could tell us if disk read-write access times had much effect; SCSI accelerator boards could tell us if the Mac's SCSI bus and SCSI Manager were a bottleneck. Our idea was to time file transfers between an AppleShare server and client, varying one parameter at a time—for example, disk-access speed.

While running our preliminary tests with AppleShare, we tried several different combinations of fast (10 milliseconds [ms] access time) and slow (25 to 30ms access time) hard disks on the client-server pair. Needless to say, the slow-slow combination proved the slowest. Surprisingly, a fast-fast combination wasn't the fastest. Instead, we found that using a fast disk on the server Mac and a slow disk on the client Mac produced the best results. Other factors, such as on-board disk caching, which varies from disk to disk, can also affect results.

Despite vendors' claims, using SCSI-DMA boards to improve hard disk access makes little—if any—difference in data-transfer rate under the current System, 6.0.4. One reason for the lack of any measurable enhancement in performance might be the clock speed of the CPU. A faster processor (such as the 25MHz 68030 used in the Mac IIci) might have handled DMA transfers faster than our test machine, which was a IIcx with a 16MHz 68030.

Notes from the Field

Every Ethernet interface device for the Mac was tested three different ways: with file transfers using AppleShare 2.0.1, with file transfers using TOPS 2.1 (dated November 16, 1988), and with low-level tests. We used thin-wire Ethernet to conduct all tests.

Both the AppleShare 2.0.1 and TOPS 2.1 file-transfer tests were performed with a HyperCard stack and a file-copy XCMD. The XCMD transferred a 1MB file from the server to the client, measures the time the transfer took, and averages the results for ten repetitions. These two tests (AppleShare and TOPS) should be viewed as real-world examples. They can give you an idea of how a server-client combination behaves over Ethernet.

To determine if Ethernet data transfers were faster without what we suspected was the primary bottleneck—the SCSI Manager and hard disk—we did two things (see "Moving Along"). First, we ran a low-level test for each Ethernet interface. Second, we tried using a RAM disk for both the AppleShare server and the client.

Our low-level test used two Macintosh Programmer's Workshop (MPW), C programs to transfer packets of data directly from the RAM of one Mac (the

ETHERNET INTERFACES[1]

Product	Vendor	Price	Thick-wire	Thin-wire
BOARDS FOR MAC II FAMILY[2]				
EtherLink/NB ★	3Com Corporation	$595	•	•
EtherPort II ★	Kinetics	$595	•	•
EtherTalk Interface Card ★	Apple Computer	$699	•	•
FastNet III ★	Dove Computer Corporation	$599	•	•
GatorCard E/II ★	Cayman Systems	$595	•	•
Mac2000[3]	Network Resources Corporation	$995	•	•
MacCon II/E ★	Asante Technologies	$595	•	•
NAE 2000	Novell	$595	•	•
NIA310 MacConnect ★	Racal Interlan	$549	•	•
NuvoLink II	NuvoTech	$395	•	•
SpeedLink ★	EMAC	$549	•	•
BOARDS FOR MAC SE				
E4020 ★	Cabletron Systems	$599	•	•
EtherLink/SE ★	3Com Corporation	$595	•	•
EtherPort SE ★	Kinetics	$595	•	•
FastNet SE ★	Dove Computer Corporation	$599	•	•
GatorCard E/SE	Cayman Systems	$595	•	•
IPT 1000	Information Presentation Technologies	$499		•
MacCon SE/E ★	Asante Technologies	$395	•	•
NAE 1000	Novell	$595	•	•
BOARDS FOR MAC SE/30				
E5020 ★	Cabletron	$649	•	•
EtherPort SE/30 ★	Kinetics	$595	•	•
FastNet SE/30 ★	Dove Computer Corporation	$599	•	•
GatorCard E/30	Cayman Systems	$595	•	•
MacCon SE30/E ★	Asante Technologies	$595	•	•
EXTERNAL SCSI BOXES[4]				
Ether+ ★	Compatible Systems Corporation	$495	•	•
EtherSC[5] ★	Kinetics	$1250	•	•
FastNet SCSI ★	Dove Computer Corporation	$1249[6]	•	•
Nodem ★	Adaptec	$545	•	•
NuvoLink SC	Nuvotech	$495	•	•

★ *indicates boards have been tested*

[1] *All of the Ethernet interfaces known at press time are included in this table, although not all of them were tested. In most cases, the devices that were not tested were not shipping at the time of our tests.*

[2] *Supports Mac II, IIx, IIcx, IIci.*

[3] *Includes Apple's Macintosh Coprocessor Platform (MCP).*

[4] *Supports Mac Plus, Mac SE, Mac SE/30, Mac II family, and Mac Portable.*

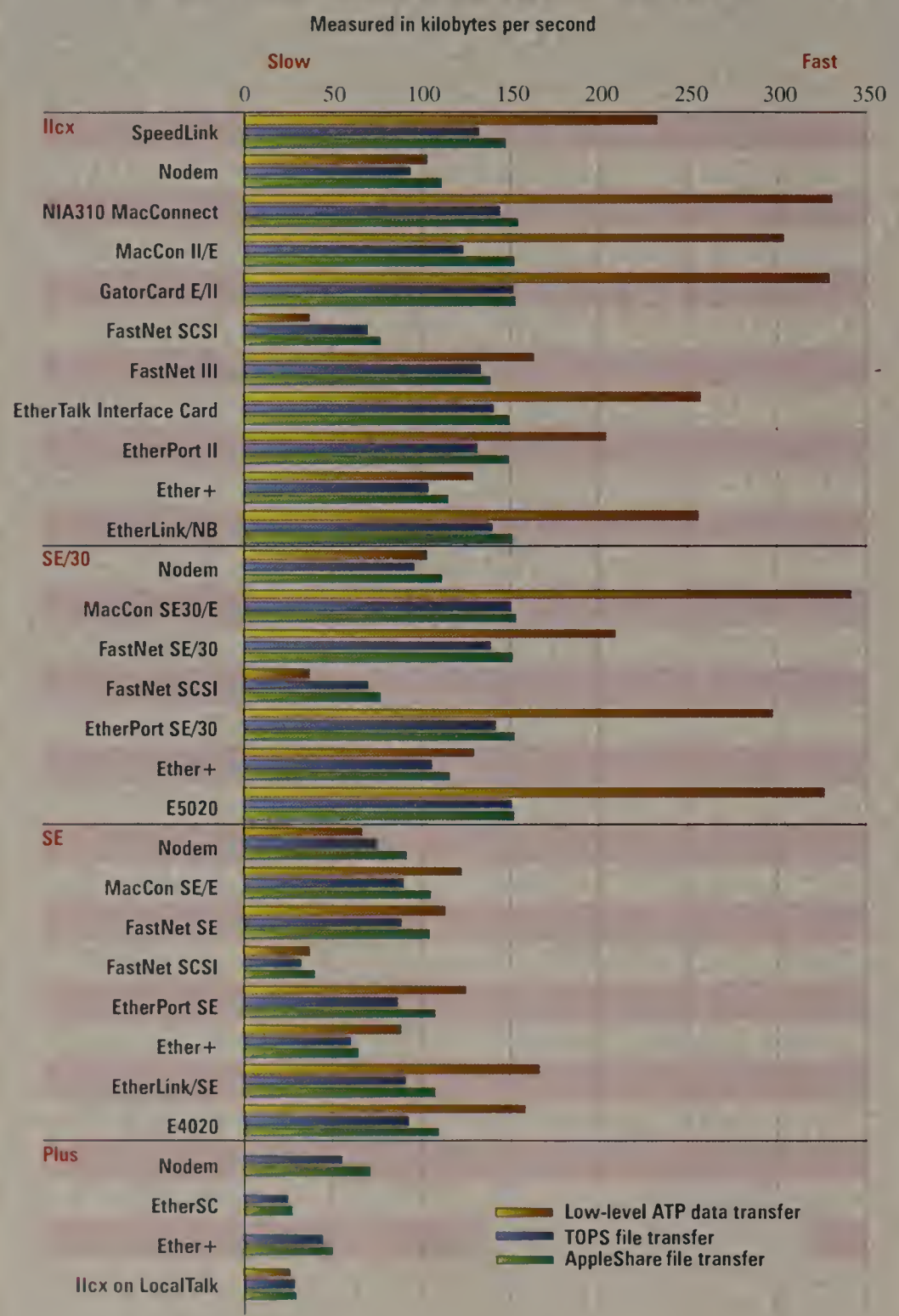
[5] *User must choose either thick-wire or thin-wire support, not both.*

[6] *Price given is for thin-wire support, thick-wire support is available for $1349.*

server) to the RAM of another Mac (the client) with the AppleTalk Transaction Protocol (ATP). These low-level test programs did their own timing and presented the results on screen after completion of each test.

Because the programs never accessed the hard disk, the low-level test avoided the SCSI Manager–hard disk bottleneck. Also, the low-level test used one specific protocol (ATP) to transfer data; thus, it depended less on the entire AppleTalk protocol stack than the AppleShare and TOPS tests did.

PUSHING THE ENVELOPE



Results of our three tests (low-level ATP data transfers, TOPS file transfers, and AppleShare file transfers) are presented here for each Ethernet interface we tested. Data is grouped according to the test machine—Mac IIcx, Mac SE/30, Mac SE, and Mac Plus. Results for the same tests using LocalTalk between two Mac IIcx computers are also included for reference. Note: Our low-level MPW test programs, for some reason, did not run correctly on the Mac Plus. As a result, no low-level results are available for Mac Plus–Ethernet interfaces.

The benchmarks we obtained from the low-level tests became our measure of the maximum performance of the Ethernet interface devices. As we discovered, it's very unlikely you can achieve those levels of performance in the real world.

It is noteworthy that the results of our file-transfer test on an AppleShare RAM disk (using the National Semiconductor Maccelerate board and software) came closest to the results of the low-level ATP tests for the same configuration. Unfortunately, AppleShare is particularly touchy about its installation on a RAM disk, and the amount of RAM you need to create a useful server volume makes AppleShare installation hardly seem worth it. Still, it did confirm our suspicion that the primary bottleneck for Ethernet data transfers is the SCSI Manager–hard disk combination.

All of our tests used a Mac IIcx with an external 321MB hard disk (Micro Net SBX-330im Wren disk with 10ms access time) and 5MB of RAM as the file server. For testing NuBus boards, we used a Mac IIcx with 5MB of RAM and an internal 80MB hard disk as the client. The client Mac SE/30 had an internal 80MB drive and 5MB of RAM; the SE used in the tests also had an 80MB internal hard disk and 4MB of RAM. The Mac Plus client we used had 2.5MB of RAM and an external SuperMac Technology DataFrame 20MB hard disk.

We tested NuBus-based boards first to find the fastest in the bunch. That turned out to be the Racal Interlan NIA310 MacConnect board. We then used that board in the Mac IIcx server to test the performance of each SCSI device and the Mac SE family add-in boards. We tested SCSI-based Ethernet devices using a Mac Plus, a Mac SE, and a Mac IIcx as clients.

Comparing Interfaces

When we reviewed the results of our tests, some points jumped out immediately (see "Pushing the Envelope"). Most important, there's little distinction in performance among various add-in boards for the Mac SE and the Mac II series. Low-level tests indicate that some boards perform better than others; real-world measures of performance are pretty much level among all boards for a particular Mac model. This

Many Ethernet interfaces exhibit similar performance on the same Mac (for example, the NuBus add-in boards). However, a comparison of their price and performance shows a wide range of values. Products with the best price-performance ratio are in the upper left-hand corner of the chart.

is probably due to the limiting factors of the disk drive and SCSI Manager when getting data through the Mac and onto the Ethernet cable.

We concluded that some boards are, in fact, capable of better performance than others, but not with the Mac Operating System's current support for the SCSI bus and hard disks. Such differences in board performance may benefit A/UX users, since the A/UX operating system handles SCSI hard disks differently from the way the Mac Operating System does.

We also found some interesting results for Ethernet SCSI devices. The Adaptec Nodem seems better suited to the slower Mac Plus and Mac SE. The Ether+, on the other hand, performs better than the Nodem with the SE/30 and Mac IIcx.

Our Evaluation

Should you buy a board or a SCSI box to connect a Mac to Ethernet? Your best bet is to install an add-in board—if the Mac model permits. Add-in boards provide the best performance, and now that their prices are falling, they offer the best price-to-performance ratio.

One interesting possibility for a less expensive workstation is a Mac SE/30 with the EtherPort SE/30 board. That combination runs as fast as the IIcx with the boards we tested.

Don't overlook the SCSI devices, however. On the average, a SCSI-based interface on the IIcx offers 75 percent of the performance of a IIcx add-in board. Depending on which SCSI device you use with a Mac SE, performance can approach 85 percent of that of an add-in board. And a SCSI interface can be easily transferred from one Mac to another.

For the Mac SE or SE/30, space for add-in boards is at a premium, with only one slot available. If you already have a board installed, you won't be able to install an internal Ethernet board too. In such circumstances, the Ether+ is a good choice.

If you're using a Mac Portable or a Plus, your only option for an Ethernet connection is a SCSI device. There's not much of a performance difference between the Ether+ and the Nodem; however, the Ether+ costs less.

Macs can easily benefit from Ethernet's speed by taking advantage of the wide variety of Ethernet interfaces available. Our tests indicate that with Ethernet, you can transfer files anywhere from 2.5 times (for the Plus) to 5.2 times (for the IIcx) faster. Although the overall costs of installing Ethernet are higher than LocalTalk, you'll get more out of your network. ◻

See *Where to Buy* for contact information.

Dave Kosiur, *a* Macworld *contributing editor, is the publisher of* Connections, *an international newsletter concerned with Macintosh networking. He is waiting for the EtherBunny to make its annual appearance*

MEDICAL DESKTOP

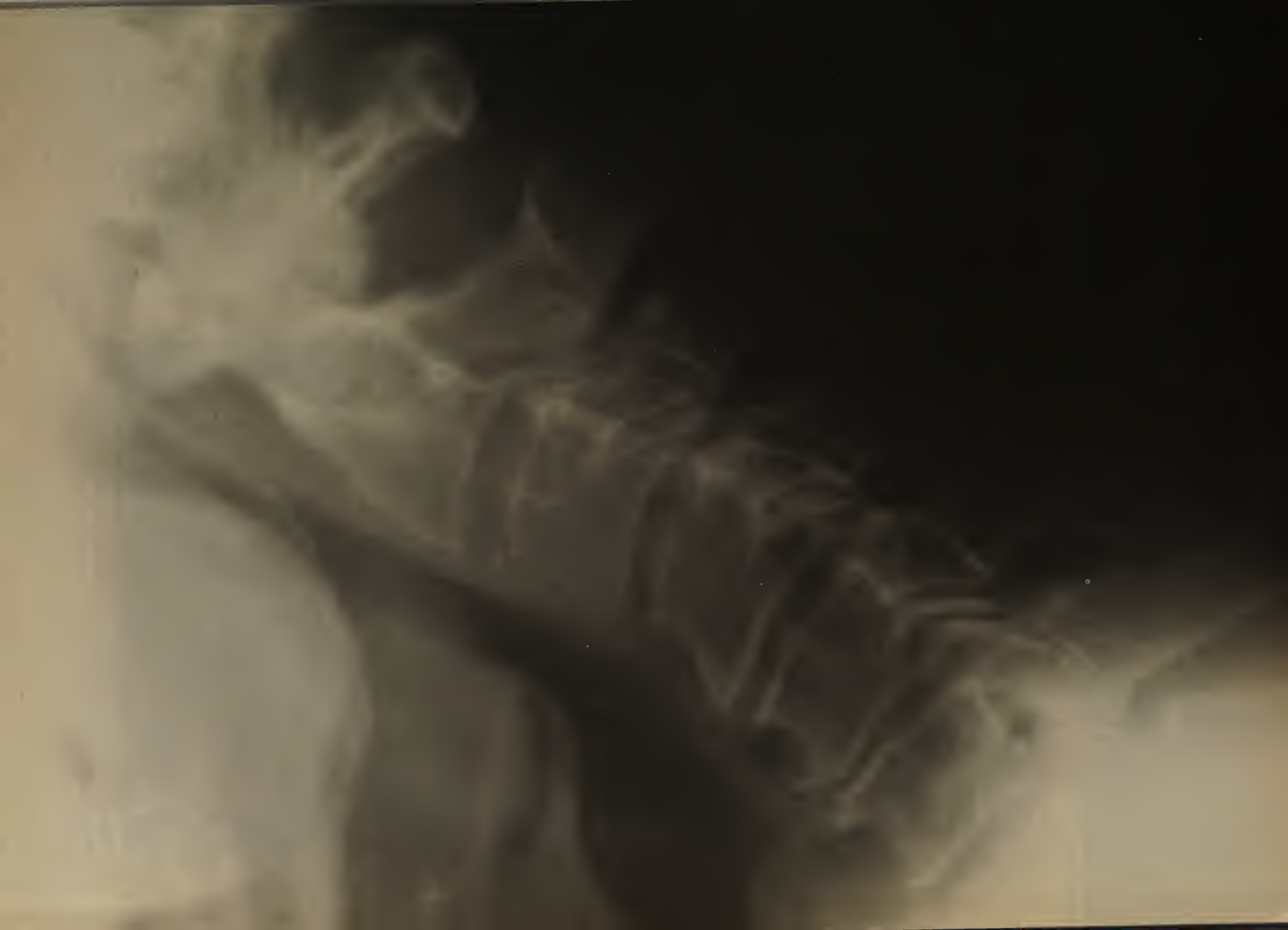
When future medical historians tally milestones in the evolution of medicine, I'm convinced they will rank the computer along with antibiotics, X-rays, and transplant surgery. Faced with a flood of data mandated by new government regulations, hospital administrators first turned to powerful mainframe databases during the 1960s. Since then computer centers have become permanent fixtures in hospitals, clinics, and medical schools.

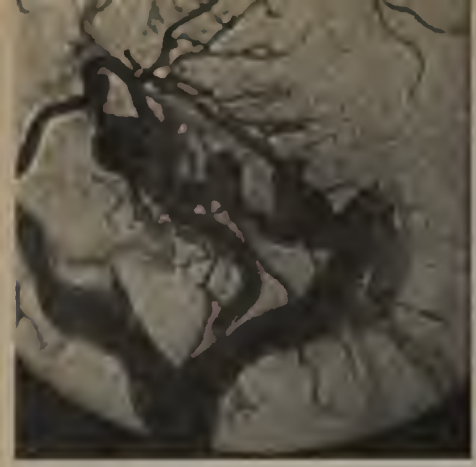
The Macintosh plays a prominent role in health care

Desktop computers promised to deliver mainframe muscle to individual users, but physicians have been slow to adopt the technology. Until recently, computer courses weren't considered worthy of inclusion in medical school curricula. And most doctors, rather than familiarizing themselves with exotic command sequences, preferred to delegate computer tasks to assistants or to a handful of computer-literate colleagues. The Macintosh, with its icon- and menu-driven interface, has played a large part in changing medical minds.

The scope and quality of Macintosh applications currently available for health care purposes is impressive (see "Mac Medical Medley"). From sophisticated analysis of biomedical research data in university laboratories to the tracking of patient billing in private practice, the Mac is assuming a critical role in all aspects of medicine. While I can't offer an in-depth look at each of the many ways that the Mac is assisting physicians, I will focus on individual projects

by Franklin N. Tessler, M.D., C.M.





Cranial arteriogram

False-colored positron-emission tomographic images

in three areas—teaching, primary care, and diagnostic imaging.

Medical Imaging Goes Mac

Although X-rays generally come to mind when most people think about radiology, the specialty has grown to include a broad repertoire of other diagnostic tests, including CT (computed tomography) scanning, MRI (magnetic resonance imaging), nuclear medicine, and ultrasound.

Despite all the high-tech equipment, radiologists most often deal with images recorded on sheets of transparency film, much as they did 50 years ago. After studying a patient's images, the radiologist usually sends a written report to the referring physician, who then decides on the appropriate treatment. Unfortunately, nonradiologists frequently complain that reports are slow to arrive, difficult to comprehend, or both.

In 1986 Dr. William Glenn, Jr., a Southern California radiologist specializing in CT and MR scanning, devised a novel solution to the problem. In addition to a typed transcript, the referring doctor would receive a brief narrated videotape showing the patient's images, with the pertinent findings pointed out and explained. Glenn used an MS-DOS computer and frame grabber to create the videotapes. This was no small feat, given the lack of video standards for CT and MR scanners. Referring physicians were ecstatic, but Glenn eventually found the system too costly and time-consuming to be practical. Still, he narrated over four thousand tapes before abandoning the approach.

One problem Glenn faced was the fact that secondary tasks such as filming consumed valuable resources on his expensive imaging equipment. Although workstations capable of handling some of the chores were commercially available, their $100,000 to $200,000 price tags made them impractical. The Macintosh II, with its ability to handle gray-scale CT and MR images, seemed the ideal solution. Glenn approached biologist Peter Marx with a proposal that Marx develop a low-cost imaging station based on the Mac II. The requirements were straightforward: the system would have to be able to accept diagnostic images directly from CT and MR machines, manipulate the images, and send them on to a hard-copy device for printing. The software would also have to be simple enough for referring physicians to master and use without special training.

MAX AGUILERA-HELLWEG

At Harbor UCLA Medical Center, Dr. William Glenn, Jr., attaches a Mac II to a very expensive peripheral—a $4 million MR scanner.

GreasePencil Enters

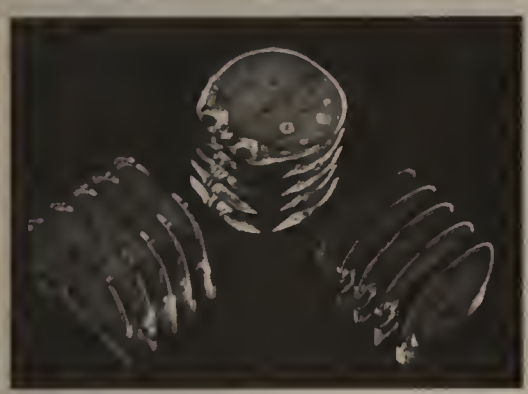
Marx, who has a passion for late-night programming, began work on the project in January of 1988. The program (later dubbed GreasePencil after the writing tool radiologists use to mark films) was ready for testing by the following May. Since then, working with two other programmers and a host of informal advisers, Marx has developed GreasePencil into a full-featured image-processing application that can view, reconstruct, and annotate images (see "Slice of Life").

Along the way, Marx faced several unexpected obstacles. For example, when he found that 8-bit images weren't sufficient, he turned to Apple's untested 32-bit QuickDraw routines. (GreasePencil was one of several applications showcased at Apple's official 32-bit kickoff last year.)

Hardware development proved no smaller problem. Whenever possible, Glenn wanted to work with off-the-shelf Apple components, sacrificing the speed offered by third-party accelerator boards in favor of wide availability. Still, there was no way to connect the Mac to the 3M Laser Imager, a $90,000 device used to print images onto sheets of transparency film. With technical support from 3M, Glenn and Marx contracted for the design of a NuBus interface card for the imager.

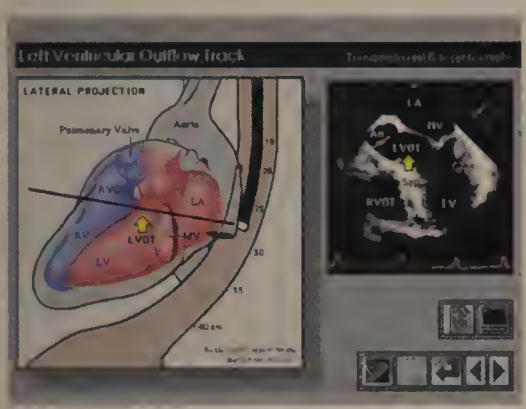
GreasePencil is being used with over 20 CT and MR scanners in California and Arizona, with more locations on the way. Referring physicians have already become ardent supporters. Using Mac IIcx's and 9600-baud modems, orthopedic surgeons can dial in to an AppleShare network at the Harbor-UCLA Medical Center in Torrance, California, and download their patients' MR scans for review. (CT images, be-

False-colored sagittal magnetic resonance images



Slice of Life

CT and MR scanners produce cross-sectional images, or slices, of the body taken at various angles (bottom). The images are stored in digital form and can be manipulated and enhanced. If the slices are sufficiently thin and close together, GreasePencil uses an interpolation process to reconstruct individual slices to appear in three dimensions (top).



Heart of the Matter

Using the Cardiac Imaging Project developed at Yale University, doctors can store and disseminate actual scanned images along with detailed drawings that provide additional information. This project was created using SuperCard.

cause of their large size, are usually shipped by courier on optical disk cartridges.) Although several companies have demonstrated an interest in marketing GreasePencil, Glenn is as yet undecided about its future as a commercial product.

Clinical Problem-Solving

The volume of medical knowledge doubles every few years, and so the trend at many medical schools has been to emphasize problem-solving skills rather than traditional rote memorization. In a project under way at the Harvard Medical School, Dr. Bob Greenes (pronounced GREEN-ess) and his colleagues are preparing to use Macs to train medical students and physicians in dealing with clinical problems more effectively.

Greenes, an M.D. with a doctorate in computer science, heads Harvard's Decision Systems Group. While in medical school, he became intrigued by the ways in which doctors order diagnostic tests and record information as they work. Greenes was convinced that computer programs using rigid checklists and menus weren't acceptable, because they compelled physicians to restrict their reasoning.

Explorer and the Mac

In 1984 Greenes began working on Explorer 1, a hypertext program that incorporates diagnostic algorithms included in the *Brigham and Women's Hospital Handbook of Diagnostic Imaging* (Little, Brown & Co., 1986). Physicians in training use the handbook's system of flow charts to help them decide which X-rays and other imaging tests are required for patients with specific symptoms.

Meanwhile, faculty members at the University of Pittsburgh were working on an IBM PC program called Quick Medical Reference, or QMR. Doctors typically use a patient's symptoms, physical examination, and test results to formulate a differential diagnosis—a list of possible diseases in decreasing order of likelihood. QMR was devised to support the doctor's decision-making process. Greenes quickly realized just how powerful a teaching tool QMR could be. Using Explorer 1 as a framework, he ported QMR to the Mac in 1986 and later incorporated it into a more comprehensive application called Explorer 2.

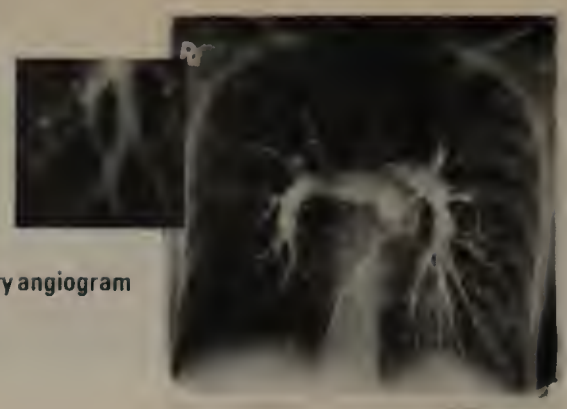
Actually an object-oriented programming environment, Explorer 2 lets authors manipulate objects in a variety of medical knowledge bases—text, statistics, medical images, spreadsheets, and simulations. In the same way that HyperCard lets users navigate through stacks containing text, buttons, pictures, and sounds, Explorer 2 permits medical educators to browse, access, and link many kinds of objects. Future versions of Explorer will allow authors to make use of other applications (such as SuperCard).

The first Explorer-based project to be included in the Harvard curriculum is a simulation involving an elderly patient with a heart-valve abnormality (see "Heart of the Matter"). Students are presented with the patient's case history; they then listen to heart sounds, order tests, and formulate a working hypothesis. They can view test results and refine their working diagnosis at any time. Because students' interactions with the program are recorded, they are actually generating medical records. Greenes believes this feature will be of great value when Explorer is used in the diagnosis of real patients.

Tracking Patient Care

If Greenes's medical school classrooms are the equivalent of a soldier's boot camp, then clinicians' offices are the front line of the health care battlefield. Unfortunately, just keeping track of what goes on consumes much of a doctor's valuable time. From the initial patient interview through each physical exam, lab test, diagnosis, and treatment, every minute detail has to be meticulously recorded.

While it might seem likely that doctors would have adopted computers for logging patient records, a glance at the reams of paper in offices and hospital wards demonstrates otherwise. Daunted by the enormity of computerizing volumes of existing records, the medical profession has continued to put up with illegible handwriting and



Pulmonary angiogram

Cervical spine radiograph

MAC MEDICAL MEDLEY

Soon after the Mac's 1984 debut, many physicians discovered how effectively the computer could be used to handle routine chores such as writing reports and preparing teaching materials. As medical professionals become more comfortable with computer technology, the catalog of Macintosh applications grows steadily. Apple's higher education group tracks an extensive list of health care–related endeavors based at United States colleges and universities. Many other projects are under way in the private and commercial sectors.

Electric Cadaver At Stanford University, Dr. Robert Chase and Steven Freedman wrote Electric Cadaver, a HyperCard program that teaches anatomy using drawings and scanned images stored on videodisk. The program was originally written by Chase for the IBM PC; the Macintosh version runs on the SE, but it requires a Mac II to display the high-resolution color images directly on the computer monitor.

Cardiac Imaging Project At Yale University, Dr. Carl Jaffe and his colleagues have developed an interactive SuperCard stack for teaching echocardiography, an ultrasound process for examining the heart. Like Electric Cadaver, Jaffe's software makes extensive use of videodisks. Jaffe's students use the software front end to navigate through information stored on videodisk.

Bone Diagnosis Project In another HyperCard project, at Pennsylvania State University, Dr. John Mayer has used the Macintosh to teach students and physicians a logical approach to diagnosing bone tumors.

PathMac Drs. Daniel Alonzo and Steven Erde with Diana Macken developed PathMac, a system for teaching pathology at Cornell University. Proving that medical educators recognized hypertext's potential even before the release of HyperCard, PathMac was created using Guide, one of the early hypertext applications.

Diagnostic Imaging While a doctoral candidate at UCLA's Department of Radiological Sciences, Dr. Osman Ratib wrote a Macintosh II–based system for examining and enhancing diagnostic images (see *Macworld News,* July 1988). Now at the University of Geneva, Ratib plans to expand the software's capabilities; among the enhancements will be modules for teaching.

Report and Image Management System Not all the pioneering work is confined to university labs. Medical Image Processing Specialists, a company in Ann Arbor, Michigan, developed the Report and Image Management System for viewing and reporting nuclear medicine images.

Teleradiology Dr. Jeremy Rubin, a radiologist in private practice in Northern California, has written an application for the Mac II that transmits and receives images over high-speed modems. Rubin's program, commercially available from Icon Medical Systems, can be used to send diagnostic images from remote sites to a radiologist for interpretation.

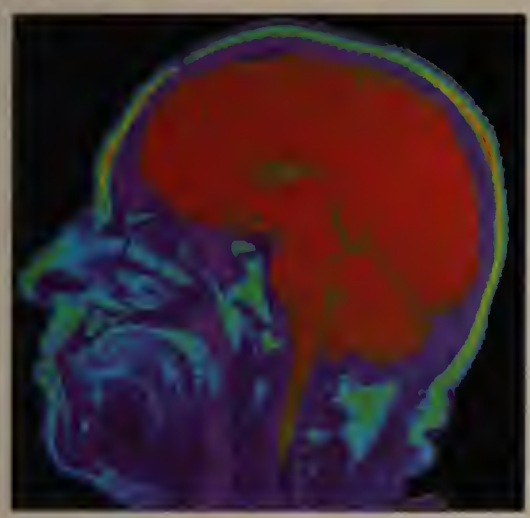
Knowledge Finder The Macintosh is also making life easier for medical researchers. Aries Systems Corporation's Knowledge Finder lets users scan through thousands of references stored on CD ROM disks to find papers relevant to their area of interest.

Bibliographic Referencing Software such as EndNote from Niles & Associates and Pro-Cite from Personal Bibliographic Software enables authors to import bibliographic references into their articles (see Reviews, *Macworld,* February 1989 and September 1988).

HealthFile In an ambitious project under way in Los Angeles, Drs. Mayer A. Brenner and Douglas McConnell are developing a Macintosh-based system they hope will revolutionize the way doctors keep records. The system, called HealthFile, assumes physicians will be happiest using tools they're already familiar with; the program emulates the index cards and other forms that doctors use daily. Designed to handle the large volume of patients in busy clinics and hospitals, the package will also be applicable to office practices. (HealthFile was prototyped using 4th Dimension, but it will be implemented in a compiled language for speed.) Negotiations are in progress to bring HealthFile to market. Brenner and McConnell believe the computerized medical chart is inevitable, and they foresee the day when a computer at the patient's bedside is as familiar as a telephone today.

Positron-emission tomographic images

Sagittal magnetic resonance image



misplaced documents.

Dr. Anthony Zahra-Newman, an Australian family practitioner with a special interest in psychiatry, was certain that computers could help dismantle the paper logjam. Most of the commercially available software was limited in scope or too difficult for most physicians to use. Attracted by the Mac's unique user interface, Zahra-Newman, along with wife Margaret-Anne and friend John McMullen, began to fashion comprehensive medical office software called the Medical Electronic Desktop, or M.E.D.

M.E.D. to the Rescue

JAM Software (the acronym is from the first names of its three founders) was formed in 1985 to develop and market M.E.D. software. Although JAM is best known for a personal reminder desk accessory called Smart Alarms, M.E.D. has been the company's primary focus from the outset. Like Greenes, McMullen and the Zahra-Newmans began their work on a Lisa; they were later joined by programmers Simon Evans, Tseung Cheung (also a physician), Frank Ng, and Alan Blair. To lure doctors away from their charts, the M.E.D. team knew they had to realize two objectives: the software had to be simple to learn and use, and it had to be capable of, at the very least, duplicating all the record-keeping that doctors were performing manually.

MAX AGUILERA-HELLWEG

A case simulation developed with Dr. Bob Greenes's Explorer 2 application is being used to train medical students at the Harvard Medical School.

A modular system of programs and desk accessories, the M.E.D. Patient application runs on the SE and later models; it is used to enter histories, results from physical exams and tests, and treatment regimens. A complete set of object-oriented drawing tools lets doctors record their impressions in graphic form (to illustrate the area of a burn or a cut, for example). Patient records can be maintained chronologically or in the widely used problem-oriented format. Since no two practices are exactly alike, all M.E.D. Patient's checklists, entry screens, and graphics can be customized using a separate program called M.E.D. Maker.

M.E.D.'s extensive medical knowledge base provides doctors with an invaluable resource. Because of the proliferation of tests and drugs available today, potentially harmful interactions are an ever-present danger. Although the physician still has the ultimate responsibility for recognizing and assessing risks, M.E.D. Patient acts like a watchdog, alerting the doctor to possible conflicts and allergic reactions. All doctors' interactions with patient records are logged automatically, and to comply with medico-legal requirements, users of the program can elect to make it impossible to alter notes once they've been written. To protect the confidentiality of patient records, M.E.D. Patient provides two levels of password protection.

M.E.D. is now being used at over 50 sites in Australia, with additional sites in New Zealand and Chile. The lack of a suitable billing module has prevented it from receiving as much attention in this country (a billing package for U.S. practices is nearly complete). One of the largest M.E.D. installations in the United States will soon be at Kaiser Permanente's HIV/AIDS clinic in Los Angeles. If the implementation is a success, the clinic will act as a model for similar projects throughout the Kaiser Permanente system.

Mac to the Future

Who the hell wants to hear actors talk?—Harry Warner, Chairman, Warner Brothers, 1927

I think there is a world market for about five computers.—Thomas J. Watson, CEO, IBM Corporation, 1947

As these memorable quotes aptly demonstrate, predicting the future of technology has always been a risky business. When the first CT scanners appeared in the early 70s, the machines were confined to large research institutions and it took them ten minutes to produce a single image. By 1980, CT scanners had become commonplace and entire multislice examinations could be completed in minutes. Today, as we've seen, three-dimensional pictures of the body can be rendered on a Macintosh. And the pace of development in other areas of medicine has been equally astonishing.

As the twenty-first century approaches, our health care system faces formidable challenges. We must provide treatment in the midst of expanding deficits and declining budgets; cope with AIDS and other catastrophic illnesses; and above all, apply technology without sacrificing the compassion that has always been the cornerstone of patient care. Whatever pathway the medical profession follows, you can be sure that the Macintosh and its successors will play a key role. ◻

See *Where to Buy* for contact information.

***Franklin N. Tessler**, an assistant professor of radiological sciences at UCLA specializing in ultrasound, is a* Macworld *contributing editor.*

An overview • of 8-bit and • 24-bit electronic • palettes

Color Paint Revisited

by Bert Monroy

Crush a car and it's garbage; put it on a pedestal and it's art. Until very recently, most artists, art directors, and curators consigned computer-generated art to the cultural dustbin. As the medium becomes more refined and accessible, however, we see the best examples being accepted as contemporary art. A computer-generated film, *Tin Toy*, won an Oscar last year, for instance.

With the advent of 32-bit QuickDraw and the proliferation of 24-bit add-on boards, the Macintosh enters the realm of professional-quality tools, and choosing a color paint program is more difficult than ever. To help you determine which program or programs are most appropriate for your needs, I will look at the more interesting features of today's leading color paint programs. Drawing on more than 20 years experience as a commercial artist, I will make recommendations and offer a few tips. (You might also want to look at "Brushes with Color," *Macworld*, May 1989.)

PixelPaint's Digital Palettes

To begin working on an image, you must first create a color palette. PixelPaint 2.0 is an 8-bit color program, which means that each pixel stores 8 bits of information, and each document created with the application has access to a palette containing up to 256 colors or shades of gray. PixelPaint Professional is designed to run on a 24-bit color system (it requires a 24-bit board); it also works in 8-bit mode. In 24-bit mode each pixel has access to a full 16.7 million colors, allowing you to create much more realistic images.

Of the color paint packages surveyed, SuperMac's PixelPaint 2.0 and PixelPaint Professional provide the widest assortment of color selection methods. In addition to several preconfigured palettes, both PixelPaint applications let you create your own. The easiest option uses Apple's Color Picker, familiar to most Mac II owners. Next, PixelPaint's Pantone color-selection dialog box provides truly effective electronic access to the Pantone Matching System (PMS) (see "Pantone Easel"). Unlike the little swatches of color that appear in most programs, PixelPaint offers a large on-screen book displaying 49 swatches at a time. It's easy to navigate through the book, and if you know the PMS number, you can type it in and go directly to the page with that color swatch. The color-selection dialog box provides space for comparing up to seven colors before you make a final selection.

Other color-selection methods include RGB (red, green, blue), HSV (hue, saturation, value), and CMYK (cyan, magenta, yellow, black) windows. A Color Theory option lets you create colors using analogous and complementary colors. (Analogous colors are those closest to the selected color on the wheel; complementary colors are those appearing on the opposite side of the wheel.)

There is also the Color Mixer, which appears in PixelPaint Professional but not in 2.0. Color Mixer closely imi-

ILLUSTRATIONS BY MICK WIGGINS

tates the way pigments are mixed on a traditional palette. You smear one color into the next and blend them to create new variations. On this digital palette, you have a scratch pad for experimenting and seven blending tools: bucket, spray can, brush, pencil, eraser, water drop, and finger. An eighth tool, a dropper, lets you pick up a desired color and make it warmer, cooler, darker, or lighter. To create gradients, you can either blend colors or apply a white-to-black ramp to any hue.

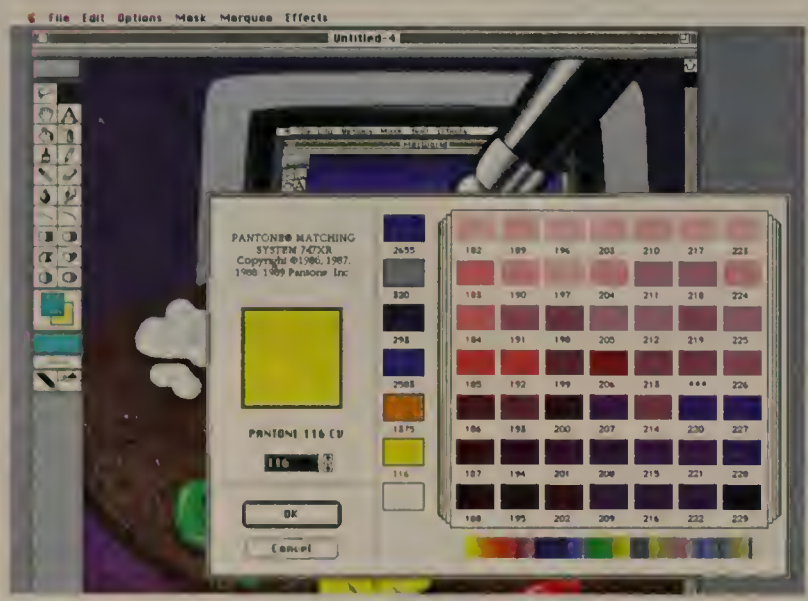
Colorama with Studio/8

If you don't like the preconfigured palettes that come with Electronic Arts' Studio/8, you can once again create your own. Studio/8's Color Mixer is similar to the one in PixelPaint, incorporating a scratch pad with six color boxes on either side. Scrolling through each of the color boxes displays a changing range of hues. You can choose a color or color range using one of four brush sizes and then smear it onto the scratch pad. New colors are automatically added to the color storage boxes at the bottom of the window (up to 230 colors can be stored at a time). To add colors to your working palette, click on a single color or a range of colors in the storage boxes. You can move only 32 colors at once, but this is a very workable number.

The Color Square window contains a grid with 14 boxes on a side. To determine a range of colors, you choose colors for the corner boxes (either two opposing corners or all four) and the gradient between the corner colors fills in. You then send individual colors or ranges of color to the palette by clicking the OK button. In Studio/8, you create gradients in the define gradients window; they then appear in a slot in the gradients-selection window on the main tool palette. You can't select a portion of a gradient as you can in PixelPaint, and the transition from color to color isn't as smooth.

DAN ESCOBAR

Ray Honda, a designer at Primo Angeli in San Francisco, created this packaging for Atari's Lynx using PixelPaint Professional.



Pantone Easel

PixelPaint 2.0 and PixelPaint Professional make it easy to select colors using the Pantone Matching System. You can page through the Pantone "book" or type in the number for the desired color; if you click on a color at the bottom of the screen, the appropriate Pantone page appears.

Modern Artist's Palette Tricks

Modern Artist's palette-modification window employs the familiar color wheel; unfortunately the implementation of this device falls short. The only visible color variations appear along the

Color Paint Highlights

	Modern Artist	Photon Paint	PixelPaint Professional	PixelPaint 2.0	Studio/8
Company	Computer Friends	MicroIllusions	SuperMac	SuperMac	Electronic Arts
Version	2.0	1.1		2.0	1.0
List price	$495	$299	$699	$395	$495
COLOR					
Mix colors on screen	•		•		•
Palette colors displayed	92 plus 4 ranges	256	16.7 million	256	256
Variable dithering for gradients	•				•
Save color ranges	•	•	•	•	•
CYMK color editing	•		•	•	
TOOLS					
Number of regular polygons	0	0	6	6	8
Smooth path	•		•		
Bezier curve			•		•
Fractal lines			•	•	
Adjust arc by apex			•		•
Any selection can be brush	•	•	via Clipboard	via Clipboard	•
Create multicolor brush	•	•	via Clipboard	via Clipboard	•
Adjust airbrush size	two sizes	•	•	•	•
Adjust airbrush shape		•	•	•	
Splatter cap for airbrush			•	•	
Mix fonts/sizes in text blocks	•	•	•	•	•
SELECTION CAPABILITIES					
Select specified colors		all but one; one only	•	•	•
Select from inside shape			•	•	•
Edit tools work with lasso		•	some, not all	some, not all	•
Levels of magnification	4x, 7x, 16x	4x and up	2x, 4x, 6x, 8x	2x, 4x, 8x	2x, 4x, 6x, 8x
MISCELLANEOUS FEATURES AND EFFECTS					
Masking		with protect colors	selection/last object	selection/last object	by shape/color
Transparent page			•		•
Visible grid	•	•			•
Open multiple documents		•			•
Screen autoscroll	optional				•
Wrap object onto shapes		•			
Bend selection			•	•	•
Resize selection by percent		•			
Move drawing in Show Page	•		•	•	
Light source, diffuse selection	•				
Tile effect		for wrapped objects	•	•	
Sharpen, diffuse selection			•	•	
Online help	•		•	•	•
INPUT/OUTPUT					
Read*	1, 2, 5, 7	2	1, 2, 3, 5, 6, 8	1, 2, 3, 5, 6, 8	1, 2, 3
Save*	1, 2, 7	2	1, 2, 3, 5, 6, 8	1, 2, 3, 5, 6, 8	2, 3
Create color separations			via utility	via utility	

** 1 = Paint 2 = PICT 3 = TIFF 4 = IRIS 5 = EPS 6 = PixelPaint 7 = rPIC 8 = Start-up screen*

wheel's thin outline. Although the center of the wheel does contain color information, it appears white on the screen. The palette-modification window also contains a box that displays the key color being modified. To the right of the key-color box are three bars called the Color Sorting Area; each bar has five swatches that relate to the key color in hue, tint, and intensity. This is where you view color modification and ultimately select the color to be used.

Once the desired color is created, you simply drag it from the sorting area to a slot in the user-defined palette. Even though Modern Artist allows you access to 256 colors per document, it displays only 92 of them in the palette. Modern Artist has two modes: standard and expert, which creates a very nice dither for blends.

Wrapping with Photon Paint

Another player in the market, Photon Paint, opens with the standard system palette. Triple-clicking (sometimes it takes four clicks, actually) on any color brings up Apple's Color Picker window. The major complaint I have with this package is that it breaks away from the Mac's user interface so completely. Creating blends, gradients, and color combinations is much too labor-intensive. The program has some nice features, but I found the palettes in Photon Paint much too frustrating.

Wood Be Fun

Studio/8 comes with an assortment of scanned textures ranging from soft fabric to stonelike faux marble. To create this image, I chose the texture Dark Oak. I then rotated it to follow the angle of the illustrated palette. Next, I adjusted the perspective. Finally, I placed the outline of the palette over the texture. I eliminated one pixel from the outline to allow the texture to show through.

Colors, Colors Everywhere

Now that we've covered palette creation, let's use the colors. The tools in these programs are plentiful, and most retain the look-and feel of the old MacPaint. But there are dozens of new tools too.

PixelPaint 2.0 starts with the usual assortment of tools—pencil, modifiable brush, bucket, hand, and eraser—but each one also comes with a special-effects mode. A toggle switch at the top of the toolbox takes you from normal mode to special effects. In special-effects mode, each tool has its own menu. When the brush tool is selected, for instance, a Brush menu appears, containing 17 options, including diffuse, shadow, smooth, smear, darken, and lighten. You can even paint with whatever is currently in the Clipboard.

The line tool, in special-effects mode, has quite a few options including Fractal, which lets you control how jagged a line will be. I recently used this feature to illustrate a vine-covered wall. Lines created with fractals also come in handy for cracks or lightning.

The number of selection tools in PixelPaint is impressive. The usual effects—smooth, blur, diffuse, and so on—can be applied to selected areas; there are nine levels of warp; and you can view a fish-eye-lens version of the image. You can also distort, slant, free rotate, add perspective, and even blow up a selection as though it were on the outside of a balloon.

In PixelPaint Professional, on the other hand, the tools are always in special-effects mode. The program includes a few new tools that until now have appeared only in advanced image-manipulation programs. Even in 8-bit mode, all the tools

COMING SOON...

Here's a glimpse at three new color paint programs that were not yet released when this article was written—PhotoShop from Adobe, ColorStudio from Letraset, and UltraPaint from Deneba Software.

The first two programs are billed as photo retouching and color prepress programs first and color paint programs second. While both programs work in 8-bit mode, they shine in 24-bit mode. The tools and color-handling abilities in both programs are strong enough to give major paint-box systems (the ones that currently bear price tags in the neighborhood of a quarter million dollars) a run for the money. Both programs are so heavily layered with features that it would require an entire article to discuss their potential. Due to space limitations, all I can give you is a teaser.

To select colors that relate to a chosen color, you can use the Grow command from the Select menu; colors falling within a standard deviation of the original and whose pixels adjoin it are added to the selection. The Similar command works in much the same way, but colors that fall within the standard deviation throughout the entire image are selected.

If you use the above commands in conjunction with the airbrush, for instance—which lays down a smooth transparent coating of color that increases in opacity as you apply subsequent coats—you can paint over a discrete element within the document—a flower, for example. If you invert the selection, the airbrush passes over the flower.

The feather option fades the edges of a selected area out to a definable distance, creating a smooth edge that blends into the background. Filters provide effects such as motion blurs that are not possible anywhere else. For example, I recently broke up an image into a series of mosaiclike tiles. I designated the tiles' size. I then applied a Find Edges filter to outline the mosaic tiles, then I applied a diffusion filter. The result was a shag rug that I then distorted, added perspective to, and laid on the floor of a room I was drawing.

As if the vast assortment of tools and effects were not enough, there is even antialiased type that's compatible with the Adobe Type Manager.

ColorStudio is an incredible upgrade to its predecessor, the black-and-white ImageStudio, from Letraset. Colors can be selected in a variety of ways including a Pantone selector that when released will set a new standard.

The Bucket tool uses fill patterns in much the same way as ImageStudio does, but with an added feature: you can store fill patterns. You select patterns from a floating window called Fill Pattern Library, which displays a large swatch of available patterns as well as the currently selected pattern. The number of patterns in the library is limited to memory. There are some useful fill patterns bundled with the program. As in PhotoShop, the features go on and on.

Deneba's UltraPaint should be available by the time you read this. Combining color paint capabilities, object-oriented drawing tools, and gray-scale image processing, the program promises to provide a number of sought-after tools. Autotracing, bezier curves, rotation, and 600-dpi precision are among its many features.

Still Life on Cloth

This image was painted from life using a prerelease version of PhotoShop. The program's sophisticated 24-bit blend and smooth tools make it possible to render representations that are surprisingly realistic.

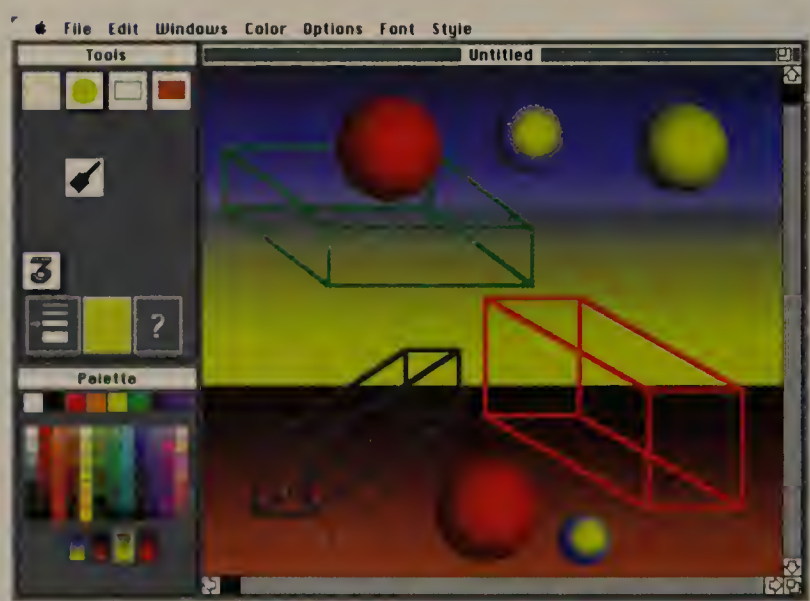
can produce an antialiased stroke. (Antialiasing is the blurring of a line or edge to give the impression that it is smooth and not stair-stepped.) If for some reason you want the familiar jaggies associated with bitmaps, you can turn off the antialiasing. In 24-bit mode, the airbrush performs beautifully. Its spray is nice and even, not the pixelized splatters we've tolerated in the past.

Select Tools

Studio/8 comes with the usual set of tools. The brush is the only tool with its own menu, and it offers a broad range of special effects. You can smooth overlapping colors, lighten or darken the current color, or blend colors. The neon brush works with selected gradients; and when you cross a line over itself, the edges blend perfectly rather than overlapping each other. The Last Object->Brush tool lets you transform the last object you created into a brush. The Trace with Brush tool traces any selection with the currently selected brush.

Studio/8's selection tools—lasso, marquee, and polygon—distinguished the program when it first came out. To make multiple selections, you hold down the ⌘ key while selecting. (The Shift key is traditionally used for this purpose.) Pressing the Control key freezes the cursor into a pointer, which makes it easy to move or duplicate selections. The selection tools have four methods of operation: No Shrink selects an entire area, including background; Shrink selects objects, omitting the background; Shrink/Transparent omits all background color (which is great for those holes in letters like O and B); and Expand selects from within a color.

Another great feature in Studio/8 is the Define Perspective Plane window. You simply click on a button to determine the angles of perspective to be viewed real-time in a view window. A small grid responds to your commands. Once you've settled on a perspective plane, any selected object will be cast into that plane. You can also fill the perspective plane with the selection; for instance, you can take a scanned sand texture and create an entire beach (see "Wood Be Fun").



Spheres and Boxes

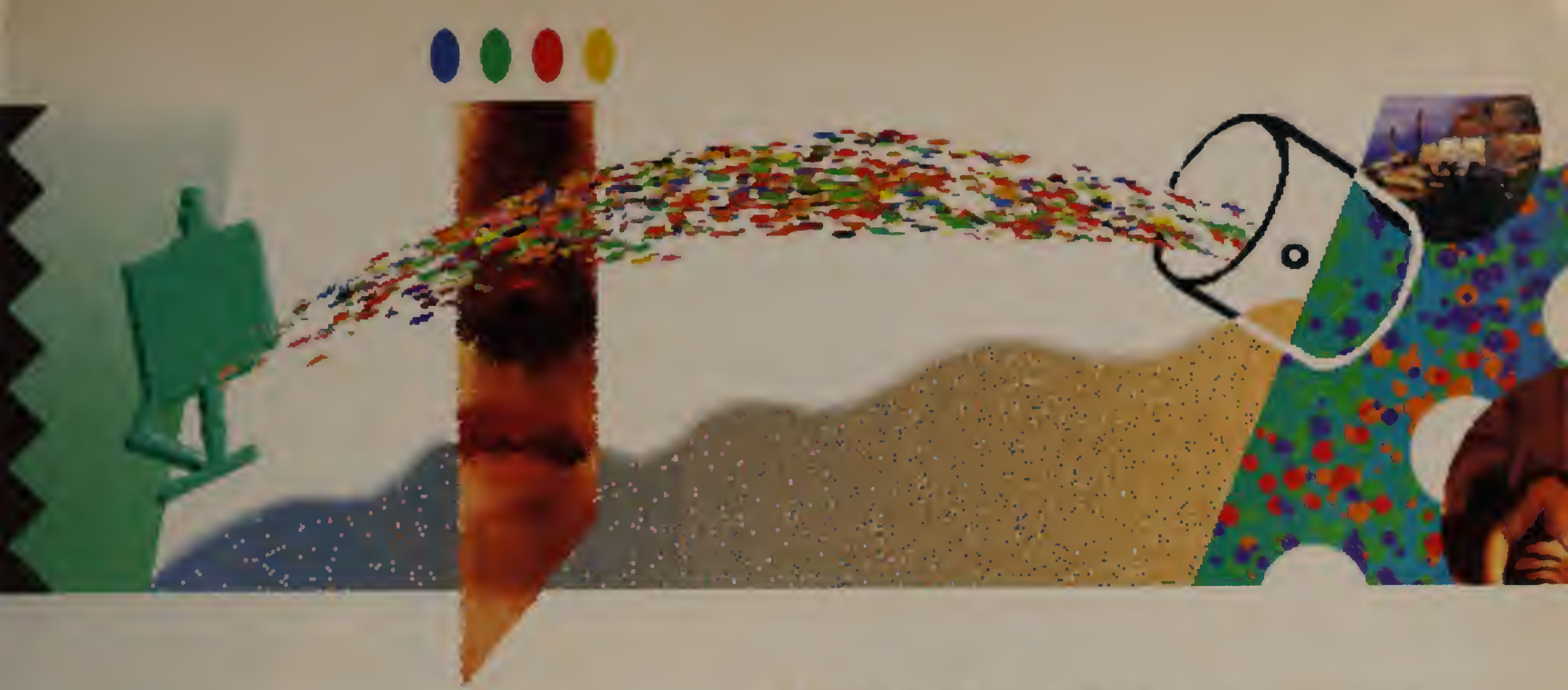
Using the 3-D effects in Modern Artist, you can easily create shaded spheres and outline boxes. To choose the shades for the sphere, first pick a color for the 3-D tool; then assign a color to the circle tool. The sphere will contain a gradient between the two colors. To create a see-through box, draw a rectangle while in 3-D mode. The program automatically draws the back sides of the box, which can be sized with the mouse and dragged into position.

Tools, Tools Everywhere

The oval tool has a nice advantage in that it lets you rotate ovals into any position as they are being created. There's a bezier-curve tool and an arc tool that let you modify objects as they are being created. A Multi-Draw feature lets you create trails made up of repetitions of one object.

Studio/8's masking capabilities are still my favorites. You can mask selected objects or the last object created; mask individual colors or ranges; invert the mask or even save it for later use.

Finally, a feature that is definitely worth mentioning—all the tool modifiers, color and gradient selectors, and line-weight and pattern selectors can be torn off as independent, floating windows.



Buckets and Spheres

The tools in Modern Artist are not as intuitive as many of us would like, and the icons are generally unlike those in any other program (the paint bucket is flipped horizontally, for instance), but some of the tools do include some very nice features. In 3-D mode, the circle, rectangle, and brush tools draw sophisticated images. If you use the brush in 3-D mode to draw a crawling worm—even with a shaky hand—it's easy to get a smooth curved stroke with a ribbon effect; the 3-D color appears on the front of the ribbon, the brush color on the back. The rectangle tool lets you create boxes; you can even manipulate their depth (see "Spheres and Boxes"). The circle tool lets you create spheres lit with a movable light source.

Mapping Shapes

About the only cool feature I found in Photon Paint is the ability to wrap images onto spheres and other shapes (see "Wrapping It Up"). The early ads for the program played up this simple process, which works with any selected image. You can map the images to predefined shapes or to your own shapes using menu choices. The results are quite good; but whenever I really need that effect, I prefer to use one of the great new 3-D packages that generate much cleaner texture maps.

Finishing Touches

If you're looking for a color paint program, you must gauge a program's strengths; you may need to combine programs if one doesn't meet all your needs. This raises the question of file compatibility between programs. Most paint programs save documents in their own formats but can also save files as PICT images. For instance, I usually create intricate line work in Adobe Illustrator 88. While in artwork-only mode in Illustrator, I save the image as a PICT file. I then bring the file into PixelPaint to add color and save it once again as a PICT file. I then use the masking capabilities in Studio/8, which also reads PICT files, to add texture.

As a professional illustrator it is important that I keep an eye out for new advances in the technology. Given the state of the art today, if I could afford only one package, I'd choose PixelPaint Professional. It has the most to offer and is remarkably easy to use. If I could add only one other package to my electronic paint box, it would be Studio/8. The two programs complement each other wonderfully.

It's exciting to watch the technology develop. It is now simple to create images using sophisticated effects that until recently were only possible if one had access to an army of outside consultants and a hefty wallet. When I was a kid playing with crayons, I never dreamed that a medium as rich and versatile as computer graphics could ever exist. How I envy the kids of tomorrow. ◻

Wrapping It Up

Photon Paint's best feature is its ability to wrap images to a shape. Here the image at the bottom of the screen is wrapped around a sphere, a cylinder, and a cone. One drawback is that Photon Paint's tools and palettes (left) take up so much screen space.

See *Where to Buy* for contact information.

Bert Monroy *is a professional illustrator and animator with extensive experience on the Macintosh. He is also a partner in Incredible Interactivity, a graphics firm.*

ERASABLE OPTICALS

new light on data

ERASABLE OPTICAL DRIVES ARE PLENTIFUL, BUT STILL NOT CHEAP

The first optical drives wowed people by storing huge amounts of data on removable, sliver-thin disks. But because data could be written on the disks only once, they weren't a practical storage solution for most people. Finally the day has come when data can reliably be written to the disks, erased, and written again. Tests from Sony and other drive manufacturers show that you can perform 1000 of these read-write cycles per day for 40 years with no problems—a figure comparable to that for magnetic disks.

Magneto-optical drives, or more familiarly, erasable opticals, use erasable, removable 5 1/4-inch disks that store approximately 300 megabytes of data per side. These disks look like audio compact disks and come packed in a hard plastic cartridge, with a metal door and a write-protect switch. Unlike compact disks, which you remove from the case to play, erasable optical disks always stay in the case, even when you insert one into the drive. Thus, erasable optical disks are often referred to as cartridges.

Effectively, an erasable optical drive gives you a series of independent, not particularly fast 300MB hard disks that have one remarkable property—they can be ejected like floppies and carted easily from sys-

BY CHARLES SEITER

USA

tem to system. The price for a drive, however, is steep—around $5000. After that initial outlay, per megabyte cost of storage is dirt cheap. For about $250, you get 600MB of storage—that's about 42 cents per megabyte. You'd pay about $500 for an equivalent set of 750 rather inconvenient floppies or about $1300 for a set of 45MB Syquest removable hard disk cartridges.

Is this your ideal storage system? Well, maybe. Because the technology is still new and the drives are not yet sold in large quantities, erasable opticals command stiff prices—an average of $5500 per drive. For comparison, a 300MB Winchester drive costs about $3000 and provides significantly faster data transfer, making it better as a start-up device or as a network file server. In addition, a high-capacity Winchester drive gives you 600MB of continuous space, while erasable opticals give you a maximum of 325MB per volume—an amount that may be uncomfortably small for networks with more than ten users.

The 15 drives I tested used either Ricoh or Sony drive mechanisms. As a result there is little difference in performance, reliability, and storage capacity between them. Only Storage Dimensions' LaserStor drive (which was not quite ready for review when this article was written) uses a mechanism developed by Maxtor and offers cartridges with a capacity of 500MB per side. Differences between the drives can be found in software, documentation, warranty, and price. I'll give you a closer look at the pros and cons of owning one of these tempting drives, and I'll pick some price-versus-performance leaders from the array of current offerings.

Favored Foursome

Four erasable optical drives provide a superior combination of value and features: (clockwise from left to right) the Microtech OR650, the Pinnacle Micro REO-650, the La Cie Cirrus 600, and the PLI Infinity Optical.

Different Tasks, Different Tools

Several types of applications scream out for an erasable optical drive. If you need a high level of data security for a database or other large body of information, you can make several copies of your data on different erasable optical cartridges and store them in separate safes. The hard plastic cartridges that contain the optical disk are also ideal for shipping or transporting data—distributing databases to branch offices from a central location is a popular use of erasable opticals.

If you need access to lots of graphics or digitized sound files, note that four cartridges give you command of 2.4 gigabytes of data. That's an impressive amount, but it's even more impressive that you can access random files at speeds approaching those of a hard disk. Mac users who need to maintain libraries of color PICT files, digitized sound, or databases will find these drives the most convenient way to do it.

All the drives I tested worked with no glitches, straight out of the box

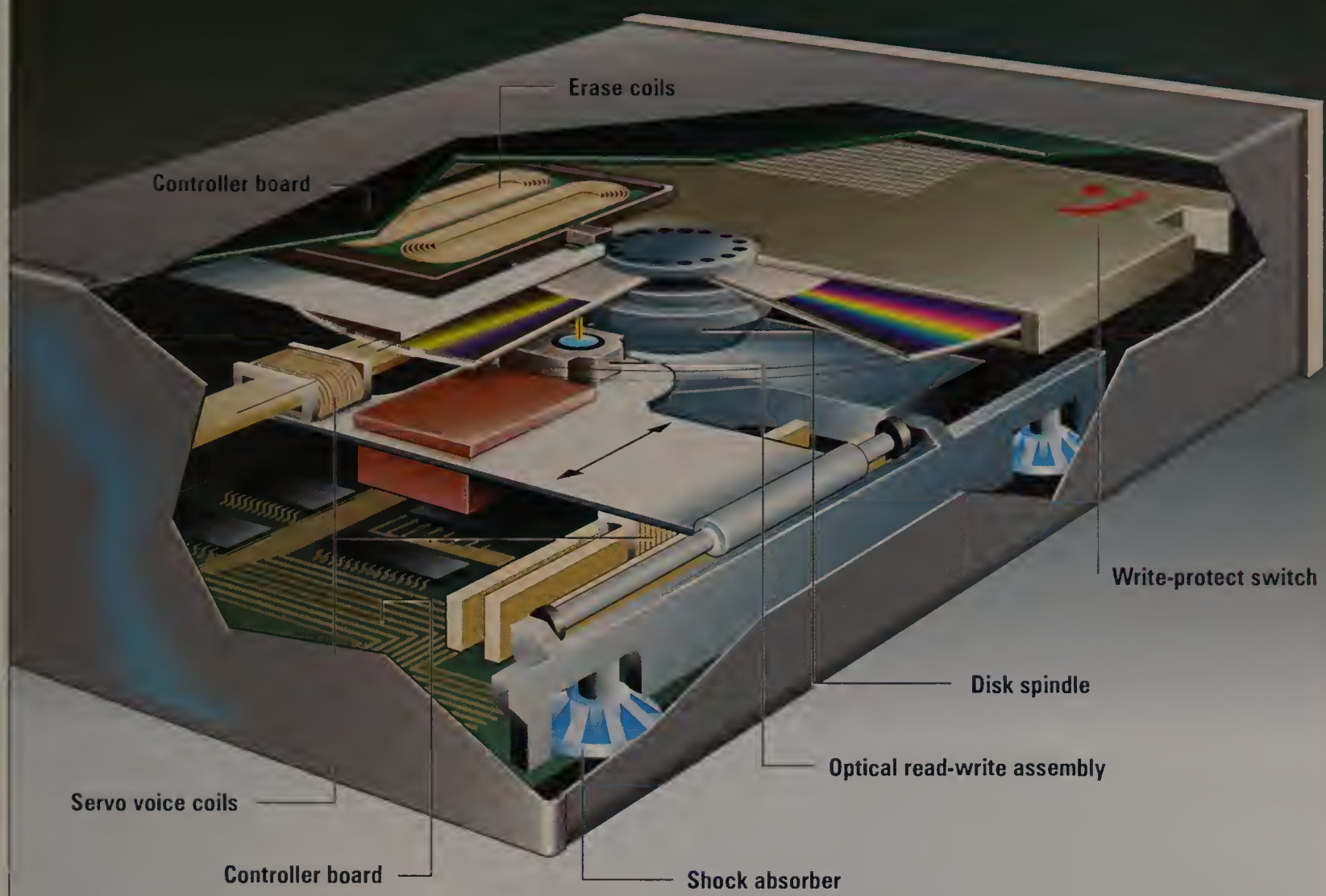
Finally, erasable optical drives offer an excellent solution to the problem of archiving tons of files in a small amount of space. Alphatronix, whose founders developed much of the technology behind erasable optical disks in the early 1980s, have performed numerous tests that indicate a physical shelf life of more than ten years for the polycarbonate and metallic-film disks. In short, you don't have to worry about storing files only to find that the disks have worn out.

Bugless Wonders

Not only are the disks made to withstand day-to-day storage demands, but the drive subsystems that hold the disks are also quite reliable, as is the driver software. All the drives I tested, in contrast to high-capacity hard drives, worked with no glitches, straight out of the box (see "High-Capacity Hard Disks," *Macworld* November 1989). No driver software caused the system to crash nor were any data files corrupted or lost.

Drive reliability is directly related

Looking Inside



As you would expect, an erasable optical drive is somewhat more complex than a conventional magnetic disk drive. Besides the several sets of magnetic coils, you can see the read-write laser assembly a little to the left of the disk spindle. Erasable optical drives have a write-protect switch, much like the one on floppy disks (upper right). Also, looking at the mechanism you see some of the reasons why optical drives are slower than magnetic drives. First, a pair of erase coils is used because optical drives require an "erase-then-write" cycle. Second, the mechanism that moves the laser head is heavier than the mechanism used to move a conventional magnetic read-write head.

to the storage technology (see "Looking Inside"). Unlike hard disks or floppies, the data on an erasable optical cartridge is safe from damage by stray magnetic fields, such as those near the back of a monitor. Erasable optical drives don't suffer from head crashes either since the optical read-write head is very far from the surface, at least in comparison to a hard disk. Finally, the drive subsystem manufacturers use sophisticated, proprietary error-checking schemes to ensure data integrity. These schemes are only possible because of the optical drives' high capacities.

The Formatting Quandry

The read-write assembly on these drives is relatively large and heavy, so there's typically only one assembly per drive unit (Pinnacle Micro offers a two-drive unit and a multidrive "jukebox"). This is why you must turn the cartridge over to access both sides; the cartridge looks to the Finder like two different 300MB drives that trade places on the Desktop.

The 300MB figure is approximate. There are two types of commonly available cartridges, a 512-bytes-per-sector variety, which can be used in Sony or Ricoh drives, and a 1024-bytes-per-sector variant only for Sony's. Contrary to what you might think, the 1024-bytes-per-sector cartridges hold only 50MB more than the 512-bytes-per-sector cartridges. That's because the 1024-bytes-per-sector cartridges use about half the number of sectors that the 512-bytes-per-sector cartridges do.

SPEED, CACHES, BENCHMARKS, AND ALL THAT

The quoted data-transfer rate for any of these erasable opticals is better than 600 kilobits per second. That works out to 75K per second, suggesting that an erasable optical should be able to open a 300K Excel file in 4 seconds, plus a few seconds for overhead. Nothing remotely like this is possible, nor can you open a 492K Illustrator file in 7 seconds. The 75K-per-second transfer rate, however, suggests that you can open a 1.2MB PageMaker file in 16 seconds, and in fact some drives come close to this (22 seconds isn't bad). What's going on here?

If the application and System File Manager let the driver software read a data file straight from the disk and write it into RAM, you see the full transfer rate. The PageMaker case is close to this ideal. If the data on the disk must pass into a buffer on the drive or the Mac that's smaller than the file and then back to contiguous RAM one piece at a time, the process slows down (the Excel case). Similarly, you lose efficiency if small files are first transferred to a large buffer. These situations incur file-management overhead and thus take extra time.

The vendor's choice of buffer size, however, isn't the only thing that influences drive speed. Was the driver written in fast assembly language or in a slower higher-level language? Can the driver bypass Apple's not terribly efficient SCSI Manager? Such factors prevent caching from having a dramatic effect on retrieval or writing of large data files, like those used in the benchmarks; the real bottleneck is generally the application or the driver.

If, however, you want to use the erasable optical in place of a hard disk, caching is still important. The Turbo Cache utility provided by PLI allows you to set up an area in memory that holds recently retrieved files and applications and then set a time delay for writing file changes to disk. This means you can improve the apparent speed at word processing or spreadsheet tasks to near-hard-disk quality.

Pinnacle Micro implements a more fundamental approach in hardware. Pinnacle's $995 Opti-Cache board for the NuBus, developed by accelerator specialists Golden Triangle Computers, combines a high-speed static RAM cache with fast SCSI circuitry that replaces the Mac's. The theory is that if you can't always match the buffer size perfectly at least you can use a much faster buffer. This produces respectable improvements when backing up a 20MB folder and helps even more (an improvement of 30 percent) when writing numerous small files, such as 20 Microsoft Word files. For reading large contiguous files, the cache does not appear to offer enough extra speed to justify the cost, but Golden Triangle has announced new firmware and software that offer still more speed.

What all this means to the consumer is that all Ricoh-based drives use cartridges that hold 286MB per side when formatted. Sony-based drives can use the same cartridges as the Ricoh-based drives or they can use higher capacity cartridges that, depending on vendor-supplied formatting software, hold up to 325MB per side.

Pinnacle Micro and Alphatronix, for example, use a 325MB-per-side Sony format but can still read lower capacity (308MB) disks. This flexibility makes the Sony drives a better choice if you plan to swap cartridges with a disparate group of people. And there's no price penalty for using higher capacity cartridges.

Ricoh has announced a hardware upgrade that will allow Ricoh drives to read Sony-formatted cartridges. That way any drive will be able to read any disk cartridge, no matter how it was formatted. There is little danger that you will buy a drive now and be locked into an obsolete format (as you are, for example, with Beta videotape as opposed to VHS).

Are They Fast Enough?

In erasable optical drives, the write process is actually an erase-first-then-write cycle, so that writing data to the disk cartridge takes longer than reading it (see "A Matter of Timing"). This means you will be happier using an erasable optical for storage and retrieval than as a substitute for a working hard disk (the opticals have a fast Open but a slow Save, so to speak).

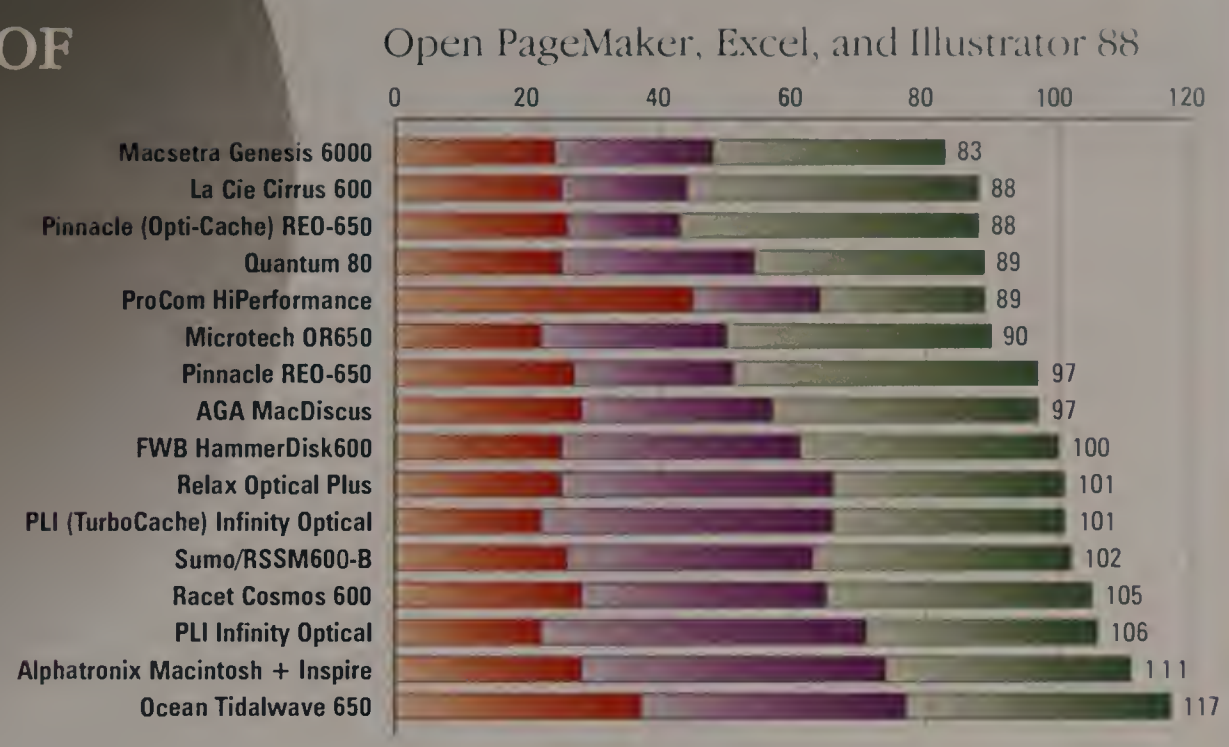
The specs that vendors love to quote don't tell you much about real-world performance

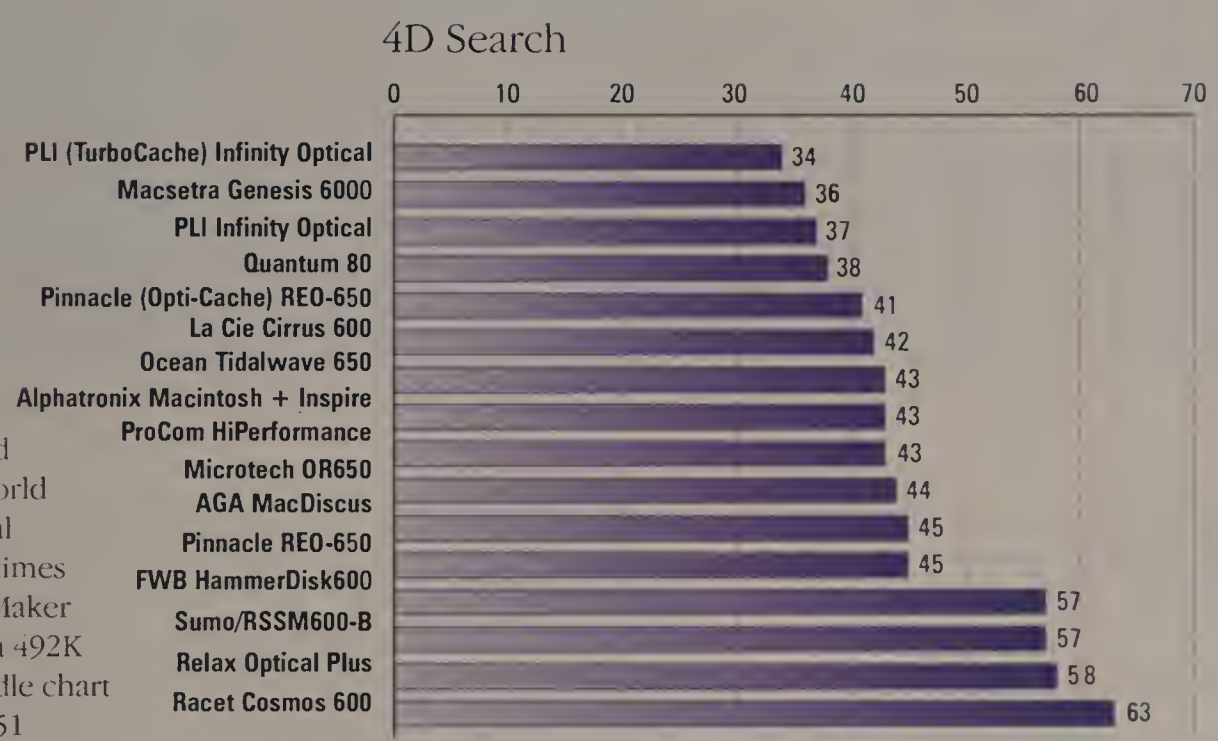
Although Sony drives have an intrinsic speed advantage (2400 rotations per minute versus Ricoh's 1800), driver software can compensate to some extent for hardware differences. Macsetra's Genesis 6000 is a Ricoh-based drive that competes with the slowest of the Sony drives. Variations among drivers depend on the programmer's skill in dealing with the details of the interactions between Apple's File Manager and SCSI Manager and the drive subsystem (see "Speed, Caches, Benchmarks, and All That"). In general, the specifications vendors love to quote—for example, access speed and burst-transfer rate (the maximum data-transfer rate)—don't allow you to guess much about real-world performance, mostly because these raw hardware figures are only elements in a larger programming scheme.

The benchmarks identify some standouts in the long list of drives. For transferring large blocks of files, the Cirrus 600 from La Cie is the speed champ, followed by drives from Pinnacle and ProCom. Note the unpredictable interactions of driver software with applications by comparing performance of these three fast drives at opening PageMaker and Adobe Illustrator files—if most of your work in-

A Matter of Timing

Measured in seconds taken to complete the task





These timings are intended to represent typical real-world tasks for an erasable optical drive. The top chart gives times for opening a 1.2MB PageMaker file, a 300K Excel file, and a 492K Illustrator 88 file. The middle chart shows the time to select 751 records from 1349 in a 303K 4th Dimension database. The bottom chart indicates the time to copy 20MB of files from a Quantum 80 hard disk, illustrating the suitability of erasable optical drives as backup devices. The unit used for these tests was a Mac IIx running System 6.0.2 and Finder 4.1.

ERASABLE OPTICALS COMPARED

Company	Product	OEM	Price	Cartridge price	Formatted capacity	Works with all SCSI Macs	Terminator
AGA	MacDiscus	Sony	$6495	$250	308MB	yes	external
Alphatronix	Macintosh + Inspire 600	Sony	$5495	$250	308MB/325MB[1]	no[2]	external
Chimera Systems	SMO-S501	Sony	$5200	$225	288MB	no[2]	internal
Computer Upgrade Corporation	DSR-SM501	Sony	$4695	$180	286MB	yes	selectable
Dolphin Systems	Sonar 600	Sony	$5995	$499	297MB	yes	internal
La Cie	Cirrus 600	Sony	$3999.95	$249	286MB	yes	selectable
Microtech	OR650	Sony	$4795	$299	325MB	no[2]	selectable
Ocean Microsystems	Tidalwave 650	Sony	$6090	$249	286MB	yes	external
Pinnacle Micro	RED-650	Sony	$4995	$250	308MB/325MB[1]	no[2]	external
PLI	Infinity Optical	Sony	$5699	$295	308MB	yes	internal
ProCorn Technology	HiPerformance	Sony	$4950	$295	308MB	yes	internal
Summus Computer Systems	LightDisk	Sony	$5495	$250	297MB	yes	external
Deltaic Systems	OptiServer 600	Ricoh	$5399	$250	286MB	yes	external
FWB	HammerDisk600	Ricoh	$4995	$295	286MB	yes	internal
MacProducts USA	MagicDrive	Ricoh	$3395	$249	286MB	yes	external
Macsetra Technologies International	Genesis 6000	Ricoh	$4995	$250	286MB	yes	internal
Racet Computes	Cosmos 600	Ricoh	$5508	$298	286MB	yes	external
Relax Technology	Optical Plus	Ricoh	$4995	$295	286MB	yes	external
Sumo Systems	RSSM600B	Ricoh	$4700	$260	286MB	yes	selectable
Xyxis Corporation	XY600RW	Ricoh	$4995	$275	287MB	yes	external

[1] *Reads high- and low-capacity formatted disks.* [2] *Does not work with Macintosh Plus.* [3] *DIP switches are internal.* [4] *Password protection for partitions.*

volves a single application, you might want to take a real file with you to a dealer and perform a specific test of your own.

Performance numbers for backing up large amounts of data (1–2GB) show erasable opticals to be two to three times slower than their main competitors—8mm video tape drives and 4mm digital audio tape (see "Backing Up with Tape Drives," *Macworld*, December 1989). But erasable opticals are much more versatile than tape drives. An erasable optical can serve as primary storage for applications and act as a substitute high-capacity hard disk. For instance, with an erasable optical, you can rapidly search for individual files.

Trying to Make Themselves Useful

All vendors except Racet provide a CDEV or INIT file that, when dragged into the System Folder, makes the Mac recognize the drive—whether there's a cartridge inserted or not. The same software lets you select the erasable optical as the start-up unit from the Control Panel.

Beyond that, software completeness varies widely. Ocean and Sumo give you bare formatting; FWB, in contrast, gives you partitioning, backup, and security software. PLI includes its Disk Cache and Disk Optimizer; Microtech includes DS Backup and the disk organizer MacTree Plus. La Cie even includes its SilverServer networking software, besides a complete assortment of utilities.

For backing up large amounts of data, erasable opticals are two to three times slower than digital audio tape drives

On a disk this size you are likely to want partitioning software. When the space on an erasable optical is partitioned into several volumes, each volume (for example, one for word processing, one for graphics—or alternatively one for each user on a network) can be mounted independently. Since each volume is treated as a separate hard disk, you can use partitioning to reduce Finder overhead, calling up volumes only as they are needed. In network use, individual users can back up and protect their hard disks in their own partitions. La Cie's Cirrus 600 unit is a standout in this area, with easy-to-use partitioning that can be reconfigured without data loss.

Security software, for encryption or password protection, is also helpful in several instances. Passwords, for example, allow you to assign lockable partitions to different users on a network. Since password-protected files

SCSI address change	Partitioning Software	Encryption Software	CDEV/INIT Software	Backup Software	Other Software	Disk Timer Access Time (in secs.)	SCSI Evaluator Read (in kbps)	SCSI Evaluator Write (in kbps)
DIP switches	yes	no	yes	no	no	30	2009	1602
DIP switches	yes	no	yes	no	no	25	1866	1435
DIP switches	no	no	yes	no	no	not tested	not tested	not tested
DIP switches	yes	no	yes	no	no	not tested	not tested	not tested
DIP switches	yes	no	yes	no	no	not tested	not tested	not tested
DIP switches	yes	no	yes	yes	DS Backup	25	2107	1792
					shareware			
DIP switches	yes	no	yes	yes	MacTree Plus	27	2009	1611
					shareware			
button	no	no	yes	no	no	24	2128	1862
DIP switches	yes	no	yes	no	no	28	2579	1597
dial	yes	no	yes	yes	TurboCache	25	2117	1661
					TurboOptimizer			
dial	yes	no	yes	no	no	24	1854	1170
DIP switches	yes	no	yes	no	no	not tested	not tested	not tested
pushbutton	no	no	yes	no	no	not tested	not tested	not tested
preset	yes	yes	yes	yes	no	49	1950	757
button	no	no	yes	yes	SmartCache	not tested	not tested	not tested
					shareware			
DIP switches [3]	yes	no	yes	no	no	76	1213	667
button	yes	no	no	no	no	53	1671	708
button	yes	no	yes	yes	no	49	1950	753
button	no	no	yes	no	no	50	1915	749
DIP switches	yes	no[4]	yes	no	no	not tested	not tested	not tested

can still be read by some utilities, for shipping sensitive corporate data files you might prefer encryption, which can involve a time investment of a few minutes per megabyte but offers absolute security—encrypted files just can't be read.

The drives with the best software also tend to have the best documentation (La Cie, FWB, Microtech, and PLI). Although you probably won't have to consult the documentation again once the disk cartridge is formatted and in use, you may be bewildered at spending $5000 to $6000 for a product that arrives with merely 12 small pages of documentation (Sumo) or that nowhere acknowledges that the device is an erasable optical drive rather than a hard disk (ProCom).

Playing Favorites

If you work with libraries of color graphics, book-length text, or large databases, you probably need the kind of capacity an erasable optical gives you right now. These drives aren't suitable replacements for a fast hard disk for word processing or database searching, but for archiving and transporting large files erasable opticals provide an effective choice, despite the price of both drives and media. For Mac users with several gigabytes of data (several thousand high-detail color TIFF files, or several files of sounds for example), erasable opticals aren't an expensive novelty but a cost-effective, practical storage solution. For you, the question is which erasable optical?

Although this market is still changing rapidly, some relative bargains have emerged. The La Cie unit offers the leading combination of price, software, and performance. Units from PLI, Pinnacle, and Microtech are a close second to the La Cie unit. Several vendors (choose your own examples from "Erasable Opticals Compared") will have to change their pricing or software policies, or both, or suffer the consequences in this competitive market.

For the rest of us—users who still have a little headroom left on a 40MB or even a 20MB hard disk—this technology promises to someday provide big, fast hard disks for less than $1000. Technology for giving erasable opticals 6000MB of capacity per cartridge is being explored, as are speed improvements that will let opticals pass up conventional Winchester hard disks. Remarkably enough, Steve Jobs, the man who bet the Apple farm on icons-and-mice for the Macintosh, seems to have, once again, correctly identified a key computer technology of the near future (an erasable optical is the basic storage for the Next computer), just a few years ahead of its time. ◻

See *Where to Buy* for contact information.

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THE WORLD OF SOLID MODELING

Beneath the Surface

In the real world, objects are made up of more than visible surfaces and edges. They are solid, and often have complex interiors. Solid-modeling CAD software gives design engineers and others the power to go beyond edge dimensions and beneath the surface in describing and simulating real-world objects.

The graphics capabilities and power of the Macintosh II have long caught the imagination of design engineers, who were eager to see serious 3-D CAD packages arrive on the platform. High on engineers' wish list was solid-modeling software.

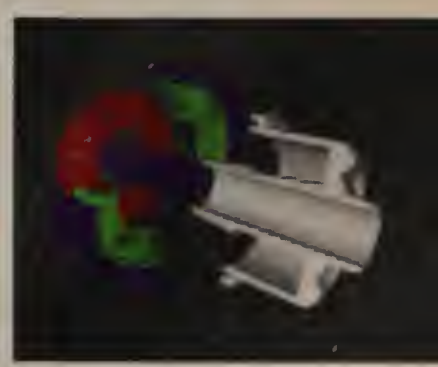
Although the Mac soon caught the imagination of CAD developers as well—inspiring a whole selection of CAD programs, many with 3-D abilities—it wasn't until 1989 that the first solid modeler arrived. And at this writing—although more programs are expected soon—Infinite Graphics' In-CAD remains the only shipping engineering and general-purpose solid modeler on the Mac. Deltasoft's Origins Solid, and Zoom, developed by Abvent, may be shipping by the time you read this. Two architectural programs, ArchiCAD and Architrion, also offer solid-modeling features.

What Is Solid Modeling?

Until In-CAD showed up, all Mac 3-D modelers were either wire-frame modelers or surface modelers.

Wire-frame representation is still the most common 3-D modeling method. Wire-frame modelers are easy to work with and economical on memory. On the other hand, wire-frame drawings don't look realistic and often produce visual ambiguity, since all edges are visible simultaneously. No lines, not even those at the back of the current view, are hidden.

Surface modelers remove hidden lines and surfaces, showing only the surfaces facing the viewer. Color, shading, and texturing



BY SASSAN KHOUBYARI

can add realism to a picture, which makes surface models especially useful for defining complex shapes. The information from both a solid model and a surface model can be used in numerically controlled programming applications to provide data to drive an automated milling machine.

At first glance, it's hard to distinguish surface models from solid models. The difference lies in how the models can be handled. Surface models provide information only about the edges and faces of an object. They can describe the interior of the object only where the designer has painstakingly created a cross-sectional view.

Because a solid model is built from solid geometric shapes, it can provide information about any point on, above, or below the surface. The designer can cut away a portion of the object at any point and angle, and the modeler automatically reveals internal details. For example, a cutaway might be used to display an engine's workings. A vertical cross section of the cylinders would show the pistons as rectangular shapes within the cylinders and their position in the rotation of the cam. A horizontal cross section through the engine head would show the pistons as circles, within the circles of the cylinders.

By contrast, with a surface modeler, cross sections of any but very simple objects are difficult at best. If you cut open a complex object, a surface modeler—which deals only in surfaces, or shells—has no way of knowing what to do with the shapes it cuts open. It sees a lot of lines and doesn't know whether to render them as insides or outsides. You have to go through and individually define surfaces. Even then it's easy to drop a stitch, leaving some unclosed lines or other stray data floating about, and end up with ambiguous surfaces or inaccuracies. With a solid modeler, if a part doesn't seem right, it's because of a design mistake, not because you've entered insufficient data.

Solid modelers also give you the ability to take space out of an object, which means designers can design certain types of objects much more quickly. For example, in a numerically controlled milling machine application, if the designer wants to drill several ½-inch holes 1 inch apart on

At first glance, it's hard to distinguish surface models from solid models

either side of a cylinder, the solid modeler actually removes the volume of the holes from the design model. In a surface modeler, there's no such thing as a cylinder, and you can't just poke holes in the skin of one. You'd have to create the holes, place them, and then go back and recreate the skin of the cylinder, with holes this time, and throw away the original cylinder.

Designers working with solid modelers use geometric primitives to define an object's shape; they then assign such properties as weight, mass, and material type to the shapes they've created. This enables the designer or engineer to test predictions about an object and detect flaws without producing a physical prototype. Solid-modeling programs typically have features for performing mass-properties calculations. They can calculate an object's weight, mass, center of gravity, moment of inertia, and surface area, as well as check for interference between moving parts.

For more elaborate analysis, a solid model can be exported to a finite-element analysis (FEA) program, where the model can be used in various simulation applications. The contours and structural supports of an airplane wing or auto body, for example, could be analyzed for performance at different potential speeds. By manipulating a solid model design in the safe environment of the computer screen, problems can be detected early on or valid performance can be demonstrated to justify building a working prototype.

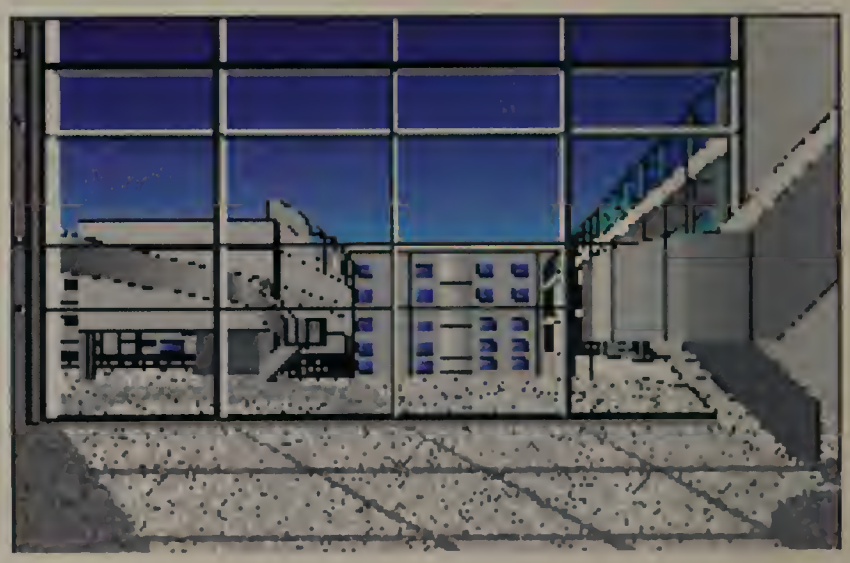
Types of Solid Modelers

While the choice of solid-modeling packages for the Mac is currently small, knowing a few things about the different types of solid modelers that exist on other platforms will help you to evaluate new Mac programs as they become available.

Current solid-modeling programs use one or more of several techniques to perform their functions. The techniques used in a particular package can make a significant difference in its speed, performance, and memory requirements.

▪ *Constructive solids geometry* (CSG) is the earliest and most widely used modeling technique in industrial CAD applications. CSG modelers are very powerful, but they can be slow.

CSG modelers use geometric building blocks, which are known as primitives, to construct objects. The modeler assembles primitives (boxes, cones, cylinders, spheres, wedges, tori) into a design object through a series of Boolean operations (union, intersection, subtraction) and uniary operations (copying, mirroring, scaling, transforming). The program represents the design object information on a binary tree, with each branch holding a set of primitives, and each node containing a set operation. A pencil, for example might be represented as the union of a cylinder and a cone (see "Reading the Tree").



RICHARD MEYER

Inside Looking Out **Architrion's volumetric database enables you to look through openings, like this window. The shadows are not painted, but are cast by a light source outdoors.**

▪ *Boundary representation* (B-rep) defines solid objects by size and orientation of edges and surfaces. B-rep modelers understand a solid as a hierarchical series of segments, each bounded by its edge and terminated by its vertices. A solid boundary is generated by the union of all the faces forming the solid. B-rep modelers are faster than CSG modelers, but are not as efficient at representing complex parts and need much more data storage than a CSG system. For example, to store a cube shape, a CSG system need record only the name of the primitive, its size, and its orientation. The B-rep system must store data on the size and orientation of 12 edges and 6 faces, a total of 18 elements.

▪ *Hybrid* solid modelers are the most common type used today. They combine both B-rep data and CSG Boolean tree data to define an object in great detail.

▪ *Nonuniform rational B-splines* (nurbs) are a newer technique, not available in any Mac solid modeler. Nurbs modelers use a B-spline mesh to represent surface geometry. They are computation-intensive, but effective for defining complex surface contours, such as aircraft wings.

Solid Modeling for the Mac

▪ *In-CAD,* from Infinite Graphics includes 2-D drafting together with a constructive solids geometry modeling program. In-CAD is a true CSG modeling system, using geometric primitives and Boolean operations to create objects. In-CAD also lets the designer extrude a 2-D shape and save the object as a user-defined primitive.

Like the better MS-DOS modelers, In-CAD's CSG modeler maintains a live tree structure of Boolean operations, which means that all past operations are continually available for editing. A message window displays information about the object under construction and its position on the Boolean tree, together with the object's size, location, and orientation. If you change one of the object's primitives, the system automatically updates the information on the live tree structure.

For example, if you change the dimensions of a box in the middle of a complex object, the CSG tree structure automatically updates the rest of the

Don't Count Out the Workstations

While the Mac has proved able to provide solid-modeling capabilities to many designers and engineers, Apple's foothold in the solid-modeling marketplace is far from secure. Solid modelers are speed-hungry programs. To advance in the solid-modeling-platform competition, Apple will need to provide faster, more powerful machines.

Most of today's solid modeling is still being done on workstations, which provide the kind of computing power required to handle complex designs and real-time solid-modeling programs. Until now, the high price of such workstations has kept them out of reach for many smaller architectural and engineering firms, but that may be changing. At the same time as personal computers are growing ever more powerful, workstations are getting cheaper.

Silicon Graphics, for example, is a leading manufacturer of workstations. In October of 1988 it introduced the Personal IRIS workstation, which runs at 10 MIPS (million instructions per second) and has a built-in 3-D graphics processor. Entry-level prices begin at under $16,000.

Silicon Graphics achieves its goal of providing a high-powered workstation for under $20,000 as a result of two major design features: RISC architecture and custom graphics chips. The 32-bit RISC-based CPU, rated at 10 MIPS, is able to handle the thousands of calculations and processes per second required to operate in real-time mode. The graphics chips support color images approaching photographic quality and provide redraw speeds that allow smooth, real-time motion of complex objects on the screen. For example, an architect can give a walk-through tour of a solid model of a new building design. The client can see how rooms and passageways will look from different angles, under different lighting, and with different furnishings.

Personal IRIS has a UNIX operating system and performs tasks through a series of windows. It provides PC emulation through a DOS window and can run software compatible with DOS 3.3 or greater. A point-and-click, icon-based user interface is also available. Personal IRIS is software compatible with Silicon Graphics' 4D line of workstations. Software for the 4D 3.0 operating system can be ported over to run on the Personal IRIS workstation.

The Personal IRIS has attracted the attention of a number of software developers. CadKey, a popular PC-based 3-D CAD developer, offers its solid-modeling package, CadKey Solids/UX, to run on the Personal IRIS. PDA Engineering and Prime Computer both offer sophisticated, high-level solid-modeling programs as well. The competition between low-end workstations and high-end PC and Mac microcomputers is just beginning. Silicon Graphics hopes to soon break the $10,000 price barrier for workstations.

Boolean operations, restructuring the object so that all the parts maintain the same relation to the box as they had before. In a surface modeler, if you make one part bigger, for example, it extends right into any parts next to it.

To see the interior of an object in In-CAD, you select a plane in space and slice it through the object in the isometric view. In-CAD removes hidden lines to show the correct shape and details of the interior at the cross-sectional plane. In-CAD's cross-sectioning features are effective but unintuitive.

In-CAD shades colored objects by ray tracing rather than using faceted shading techniques common in many PC solid modelers. Faceted shading is generally faster than ray tracing but gives the object a paneled appearance. Ray tracing provides perspective and depth, giving the object a more natural shaded appearance.

Mike Hiens, an aerospace engineer at NASA's Flight Equipment Energy Research Center (Moffett Field, California) is an experienced In-CAD user. He notes that even though In-CAD's more advanced shading method is slow, it's acceptable for his applications. Hiens uses In-CAD to create solid models of small mechanical parts and says that the program's mass-property calculation can quickly show such things as how the center of gravity of a part shifts as the weight of the assembly is reduced in the redesigning process. "There is no need to physically build the model anymore," Hiens says.

High Press Assembly
Origins' ability to provide true hidden-line removal enables it to reflect object interaction within designs, even if the objects are within, behind, or beneath one another.

In-CAD's mass properties calculations include surface area, volume, center of gravity, moments of inertia, and radius of gyration. In-CAD also provides good interference checking capabilities. This lets the designer check for interference and clearance of moving parts, and closeness of fit between parts in general.

In-CAD imports and exports IGES, PICT, Clipboard, and DXF formats. At this writing, Infinite Graphics was planning to release a new version of In-CAD; with this and future upgrades, the company plans to challenge the capabilities of many of the solid-modeling systems available for DOS users. But even in its current form, In-CAD offers a major step up for those designers and engineers already established in CAD on the Mac. It also provides an easy-to-use introduction to solid-modeling for newcomers.

▪ *Origins,* from Deltasoft, is another high-end CAD program for the Mac. Origins is primarily a 3-D surface modeler, but the company is offering another package called Origins Solid that is scheduled for release in late '89, that provides solid primitives and Boolean operations with limited mass property calculations.

Origins offers bezier surfaces, bezier ruled surfaces, elliptical surfaces, and other complex surface-generation techniques. When Origins Solid comes out, designers will be able to take advantage of Origin's tools to fashion sophisticated parts, which they can then turn into solid models.

Deltasoft claims that the Origins database can easily be used by other solid-modeling systems. An IGES translator can port the database to FEA software such as Inertia from Cumberland Technology Park and Cosmos/M from Structural Research Analysis Corporation (SRAC). The Origins database can even be ported to mainframe graphics systems and used with CSG and B-rep modelers. I was not able to test this capability, but it means the Mac could be used as a low-end workstation, saving time and money on expensive stations. (This applies to In-CAD as well.)

Origins Solid uses the hybrid modeling approach together with a nurbs geometry setup. It will also offer Boolean features to perform such functions as removing specified volumes from an object.

Origins and Origins Solid were designed from the ground up specifically for the Macintosh. Unlike some of the available high-end CAD packages such as AutoCAD, which were originally created for MS-DOS machines, the Origins interface follows the full Mac look-and-feel user interface.

Deltasoft also expects to offer a finite-element analysis package early in 1990. This package will work with Origins Solids' database and can assure database compatibility from the Origins Solid and the FEA program

▪ *Zoom* was developed by Abvent; the French company was still looking for an American distributor when this article was written. Zoom offers solid-object creation and Boolean operations such as addition, subtraction, and intersection of 3-D objects. Zoom uses an iconic user interface setup that is customizable by the users.

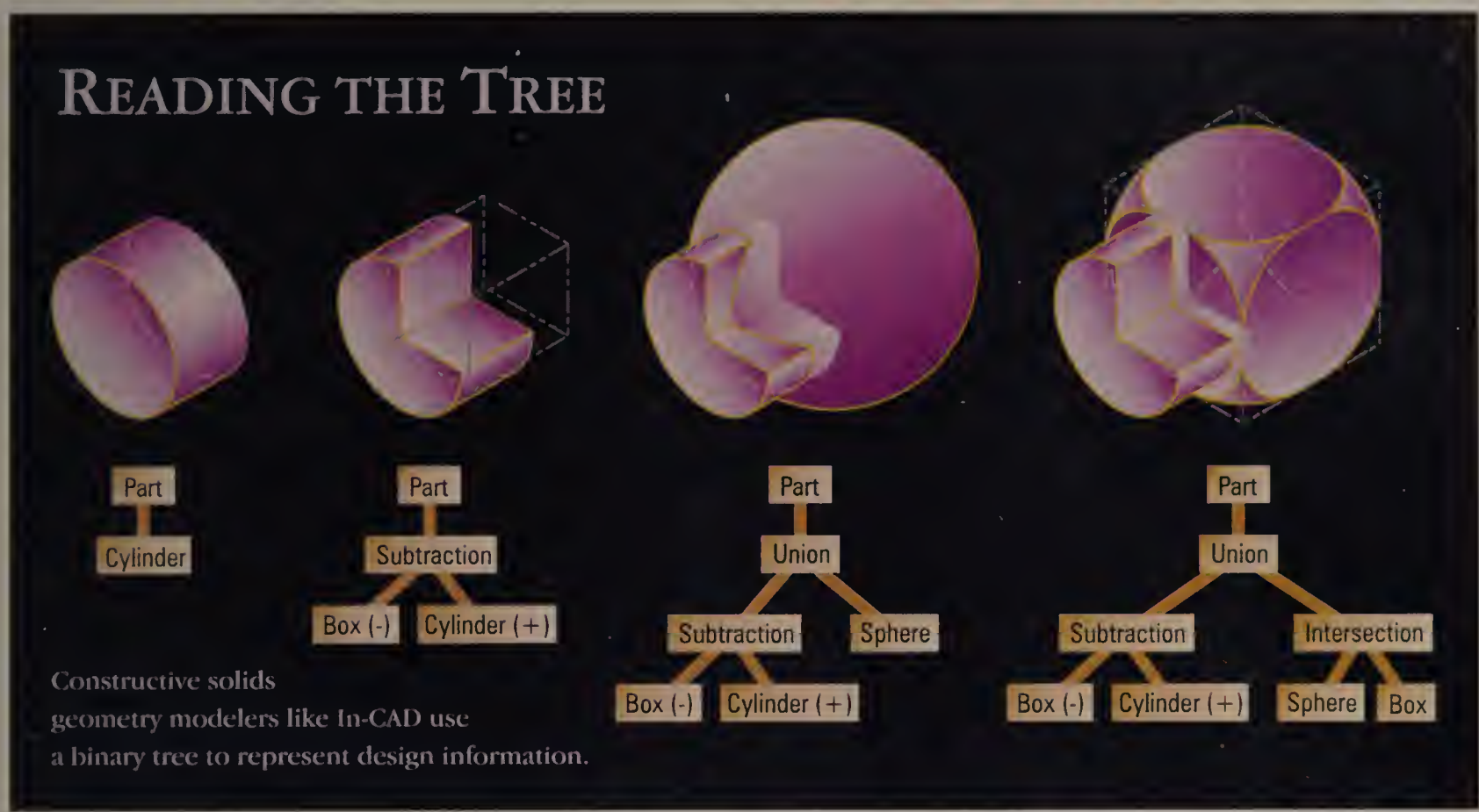
Similar to In-CAD, Zoom lets a designer see the model in up to four views in multiple windows simultaneously. Zoom's model creation in real-world coordinates works in any window or view (even perspective). You can also assign up to 128 building materials to the components of each model or file.

AEC Applications

In architectural design, Boolean operations are useful for inserting such components as doors into existing walls. Like mechanical engineers, who take advantage of all the information stored in a solid modeler database, architects also benefit from finite-element analysis to solve complex problems.

For example, solid-modeling makes structural analysis easier and more accurate than traditional methods. One problem that held architects back from using FEA before solid-modeling programs became available was the enormous amount of data that had to be entered to build a finite-element model, such as nodal location of structural member end points, the loading conditions, and the boundary conditions of each nodal point.

▪ *ArchiCAD,* from Graphisoft and Architrion from Gimeor are two excellent architectural CAD packages, and each provides solid-modeling objects and operations. For example, ArchiCAD offers a built-in library containing 3-D solid objects and construction elements (doors, windows, furniture)



Constructive solids geometry modelers like In-CAD use a binary tree to represent design information.

along with the complex 3-D operations needed to present a realistic model of a building. ArchiCAD provides Boolean operations that enable you to create "see-through" openings in solid walls, roofs, and slabs.

ArchiCAD offers a bill-of-materials function for its predefined structural building elements. The bill-of-materials lists all materials, costs, and other related information, such as a subcontractor's name, for each element.

▪ *Architrion* comprises three modules; 2-D, 3-D, and the Quantifier. At the heart of the program are a 3-D database and a volumetric algorithm that provides the solid-modeling data. The Quantifier module is a numeric data-extraction tool that produces overall-quantity or space-by-space analysis of your design. Analyses include plan areas, volumes (enclosed space, wall, and slab volumes), surface area, net-to-gross ratio, and a bill of all 3-D elements used in creating each space. The program imports and exports DXF format.

A Solid Choice

A solid modeler running on a microcomputer such as the Mac cannot deliver the capabilities and functions of a minicomputer or mainframe. One of the greatest limitations for the Mac or PCs in general is processing speed. Operations that seem instantaneous on a large system can take several seconds to perform on a Mac. And there is a practical limitation to the size of problems that a microcomputer can solve. The microcomputer, however, still offers great potential as an effective and economical platform for small-scale design and manufacture. Solid modeling can replace the paper or clay models and prototypes that are used in the early design phases.

Very soon we'll see more high-end CAD packages with solid-modeling abilities offered for the Mac. For users who demand a moderate level of complexity, the current packages can satisfy most of the demands of solid-modeling applications. And these packages will gain more powerful features as they grow into maturity.

Others, who would like to have more options to choose from, may consider waiting a few months to see what new offerings come to the market for solid-modeling on the Mac. ☐

Two Views **Infinite Graphics' In-CAD offers both isometric drawings with hidden-line removal, and shaded ray tracing.**

See *Where To Buy* for contact information.

Sassan Khoubyari *is a senior CAD software engineer at MIT and a designer of Prime-Design, a workstation solid-modeler package*

HERE'S THE PITCH

PRESENTATION SOFTWARE GROWS UP

RUSS WIDSTRAND

Good evening. I've been asked to speak to you about presentation programs—software devoted exclusively to creating and structuring slide shows for talks just like this one.

As you know, presentations are a staple of corporate life. Everyone who tries to pitch an idea—to a client, to another group in the company, to shareholders—makes a presentation. A casual talk might include an overhead projector, using transparencies to illustrate the speaker's points. More formal presentations use 35mm slides; the room is dark and the graphics must be top-notch. And lately, more and more presentations are made either on the Macintosh screen or on a projected image of it.

Most of the programs we'll be examining generate all three kinds of presentations—transparencies, slides, and on-screen shows. (Unless your company has a film recorder in-house, you have to send your files to an output service if you want them transformed into slides and transparencies.) Most of these programs also print speaker's notes and audience handouts. And the best ones help keep your colors appealing and your graphics consistent from slide to slide.

All the programs you'll be seeing are in at least their second incarnation: PowerPoint 2.01, CA-Cricket Presents 2.0, Aldus Persuasion 2.0, and More II 2.0. We'll also see what a couple of newcomers have to offer: MacDraw II 1.1 and something called Visual Business No. 5 1.02. (Another contender, StandOut, was withdrawn from our survey. Its maker, Letraset, says that a much-enhanced new product is being readied for release.)

Let's take a look at the options. May I have the first slide, please?

The Starting Point

The first dedicated presentation program was PowerPoint. While no longer state-of-the-art, it's still the model on which most of the other programs are based.

On the screen, you see a blank frame or *slide*. You add text and graphics to one slide at a time using MacDraw-type tools. If you want graphs or fancier illustrations, you paste them in from other programs; if you want to use an outliner to organize your thoughts, go buy one. PowerPoint is used primarily for assembling a show's components, not for generating them.

As you create slides, you can flip to a Slide Sorter view, where you see your slides in miniature. In this view, you can drag slides to rearrange them. You can also copy them and paste them into other presentations.

Color Me Quick

In light of the fact that you can choose from among millions of colors on a Mac II, a presentation program should suggest some appropriate color sets that work well together. This is PowerPoint's strength: its hierarchical color-selection process is excellent. First, you select a background color for your slides. PowerPoint now displays a second palette, showing a selection of foreground colors that contrast well with that background. Next, you're presented with a collection of minipalettes, each showing six accent colors. In other words, the program adjusts its available palettes so that you always have attractive, compatible colors available for any element you create.

Like most of the presentation programs, PowerPoint lets you specify a *graduated fill* for the background of your slide, where the color of

BY DAVID POGUE

the background changes smoothly, say, from a sky blue at the top to a deep blue at the bottom. These graduated fills can be stunning, and they make your presentations look extremely professional. PowerPoint even lets you specify the angle and placement of the shading. For example, it will shade from one color to another diagonally or horizontally, if you wish.

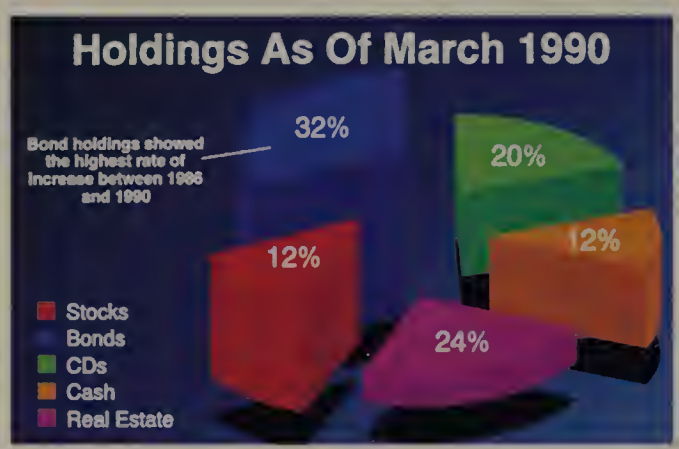
Not Much Style

PowerPoint takes some tentative steps toward automating the slide-creating process. For example, you can specify a default font, size, and color. You can also place static elements such as a logo on the Slide Master, so that these elements appear in the same place on every slide.

But if you decide to change the look of your presentation, you have to change the font, alignment, and location of every text block on every slide by hand. Multiply this inconvenience by the number of presentations you'll be making, and you start to see the program's most fundamental limitation: PowerPoint is not designed for revising your presentations.

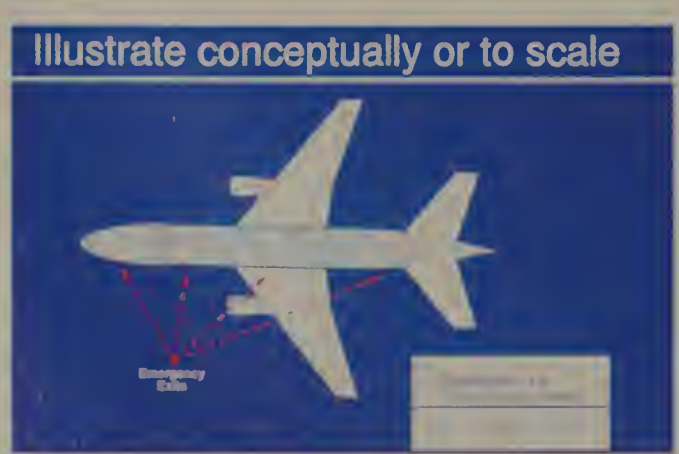
Examples abound. What if after creating a presentation for display on a Mac screen, you now want to convert the frames to 35mm slides? You'll have to adjust the position of every graphic element on every slide by hand because PowerPoint doesn't automatically compensate for the change in frame dimensions. What if you need to change some figures in a graph? You'll have to go back to Excel to make the revisions and reimport the graph.

If the flexibility of PowerPoint's color system were evident in every feature, PowerPoint would be tough to beat. As it is, PowerPoint is the simplest but most limited program on the market. And take note, on-screen presenters—it offers no dissolves or other *transitional effects.* Next slide, please.



Visual Business No. 5
Visual Business No. 5 transforms standard charts into breathtaking ones with its shading, perspective, and 3-D commands.

Persuasion
An outliner, drawing tools, and charting tools—Persuasion has everything you need to create a presentation from scratch.



MacDraw II
By extending its layering features, MacDraw II lets you create and organize slides for presentations.

The Cricket Ticket

The first substantial advantage Cricket Presents has over PowerPoint is under the Apple menu—Acta, an outliner desk accessory that comes with the program. Constructing your presentation in an outliner makes a world of difference; your entire talk is visible at once and can be easily restructured. Moreover, many people find working in an outliner much more spontaneous than working with slides. Instead of focusing on the finished artwork at every step, you can focus on the content of your presentation.

When you're finished, Cricket Presents imports the Acta outline, automatically transforming each main heading into a slide title and each subheading into a bulleted item on the slide.

Surely Template

Cricket Presents adds another useful dimension with its *template* system. In essence, a Cricket Presents template is a canned graphic design, complete with preformatted text blocks and graphic accents. Slap this ready-to-use graphics layout onto the slides, and when you import the Acta outline, the slide show is completely formatted, attractively laid out, and requires only minor adjustments.

Everything else about Cricket Presents is essentially the same as PowerPoint. It can print out speaker's notes and audience handouts; it can create transparencies, slides, or on-screen presentations (with a choice of transition effects be-

tween screens); and it offers its own variation of PowerPoint's color-scheme system.

Unfortunately, the drawbacks are the same, too: neither the Acta outline, the master slide, nor the Cricket templates are *dynamically linked* to the actual presentation. Once again, you're condemned to change every slide individually if you decide to change a font or layout. You'd think that you could just apply a new template to the presentation and the program would maintain the actual text while applying the new formatting. Instead, the program simply superimposes the new template over your existing slides, complete with dummy text like "48 PT. BOLD TITLE."

When you build a show, moreover, Cricket Presents is extremely particular about the sequence of events. The manual is full of dire warnings: Don't import the outline before applying the template! Don't specify the page size after entering text! Don't load a color palette before applying a template! It's easy to become so preoccupied with this sequence that you lose the sense of spontaneity and creativity provided by the Acta outliner. Next slide, please.

Sweet Persuasion

Aldus Persuasion has clearly been designed to connect everything in a presentation interactively. If the logo, color scheme, screen size, transparency orientation, chart data, or audience makeup changes, you just change the presentation in one place. Persuasion takes care of the dirty work.

This principle begins with Persuasion's elegant built-in outliner, which lets you do things that are impossible in other outliners. For example, you can drag a high-level heading in between two lower ones without dragging its subordinate headings along with it. The real beauty of the outliner, however, is that as you create an outline, you're simultaneously creating slides; there's no importing or converting. And you can edit text either in the outline or directly on the slide.

Persuasion ensures the integrity of a presentation's graphics with its AutoTemplate system. At first, AutoTemplates seem akin to Cricket Presents' templates: each is a formatted, color-coordinated, attractively designed dummy slide. But there's a dramatic difference. You can apply an AutoTemplate at any time during the presentation's life cycle. You can even change AutoTemplates in the middle of designing a presentation; the program will reformat and readjust all the slides so that they work well with the new design. The result: an addictive what-if power for trying out different looks for your show.

Masters of the Universe

Furthermore, you can modify the AutoTemplate within your presentation. For example, suppose you've created a 30-slide show, and you decide

PowerPoint **PowerPoint is an excellent tool for combining pre-created elements into a presentation. The color scheme suggestion feature helps you add color to your slides and—at the same time—ensures that those colors look good.**

that the title of each slide should be italicized. Just choose Slide Master from the View menu and Persuasion displays a mock-up of a slide with "This is a Title Placeholder" where the title should be. Make changes to its formatting or placement and return to your slides. All 30 have been instantly reformatted.

There is much more to say about Persuasion. Its built-in charting powers are impressive; you can ungroup the elements of a chart, change their colors, drag the slices of a pie chart around, and so on. Persuasion's graphics tools almost outdraw MacDraw. For example, Persuasion features a Regroup command that remembers the grouping of objects even after they have been ungrouped and rearranged. The program imports PowerPoint presentations, and imports and ex-

More Bang for Less Bucks

PowerPoint, $395, Aldus Persuasion, $495—there must be a less expensive way to put on a slide show.

As a matter of fact, there is. Consider HyperCard, for example. Your on-screen slides will be small—and in black and white—but you have a number of nifty transitions (dissolves, venetian-blind effects, and so on) to choose from. To make the process easier, get the Slide Show Maker stack from Heizer Software. It's only $10, and it lets you specify a transitional effect and timing for each card. If you need color and large-screen support, don't forget about SuperCard, priced at $199, or Plus, $149.

Believe it or not, the ancestor of the presentation programs, Slide Show Magician, is still alive and kicking. You create all the graphics in other programs; Slide Show Magician simply assembles them and runs the slide show, letting you add titles, HyperCard-like buttons, and even subliminal messages. It's black and white; its interface is awful; and it's sorely in need of an overhaul. But it's only $59.95, and—by golly—it actually works.

If you're resourceful, you can come up with other ways of creating slide shows using software you already own. You might program an Excel macro to display each of several charts for a certain number of seconds, for example; or buy Individual Software's terrific 101 Macros Plus for Excel ($69.95), which includes just such a macro.

ports Acta and More outlines.

You may be getting the impression that Persuasion is a complex, powerful program. You're right. It's a lot to learn. In Persuasion 2.0, Aldus has added a master master called the Background master. This is a master slide that lurks behind any slide master, and on which you can place a logo (or other element) that will appear on every single slide, regardless of its type (text slide, chart slide, and so on). What's more, you can create multiple slide masters and even multiple Background masters. This complexity—Aldus would say flexibility—is a little daunting.

Fortunately, you can ignore all of this. You can produce an absolutely beautiful presentation in half an hour using Persuasion's outliner and one of its superb AutoTemplates without ever concerning yourself with the program's more complex inner workings.

CA-Cricket Presents **CA-Cricket Presents comes with templates that help you save time when you're making slides. When you import an Acta outline, the template formats the text and adds graphics flourishes too.**

These three PowerPoint-type packages illustrate one very successful approach to presentation building. But there are other approaches. Let's see how they work. Next slide.

It's a More

More II is primarily an outlining program—a very good one. Some business people use it so much that it becomes an integral part of their workday. The program includes phone dialing and a calendar system and can even serve as an outliner-based word processor. But there's more to More II.

Where Persuasion is a presentation program with a strong built-in outliner, More II is an outlining program with a respectable presentation module. Its greatest asset is that it offers true style sheets for each presentation. For example, you can change the color of all bulleted items on all your slides with a single command. Because More's style sheets are cryptic lines of text in a dialog box, they're not as easy to use as Persuasion's AutoTemplates—but they're a blessing nonetheless.

Yet More II isn't quite as fully developed as its strictly-presentation-program competitors. For example, you can't edit the text of slides except in the outliner. So if you notice a spelling error on a slide, you have to flip back to the outline view to correct it. There's no slide-sorter view. And you can only format text on each slide on a text-block basis—not on a character-by-character basis.

Otherwise, More II's presentation features are comparable to those in, say, PowerPoint. There's a spelling checker, but no charting; a master slide, but no graphic-design templates; full color capabilities, but no ready-to-go color schemes. In general, you can create slides every bit as impressive as those generated by other programs—but More II leaves more of the work to you.

More II is primarily worth considering if you need to produce on-screen presentations. In addition to its collection of fades, dissolves, and other transitional effects, More II can operate two monitors simultaneously. In other words, you can view your notes (and the menu bar) on your private monitor, while the audience views your presentation on another.

So far, we've examined several programs attempting to be all things to all people. But there are other programs that may be everything to small groups of people. May we have the next slide, please?

Slides of MacDraw

You're probably wondering what MacDraw is doing in a discussion of presentation software. You'd be surprised—the latest version of MacDraw is now being billed as a presentation program.

MacDraw II's slide-making skills are an extension of the program's layering capability; in essence, you can place a different slide on each layer. Like dedicated presentation programs, MacDraw II has a master layer where you can place static elements that appear on every slide.

As a presentation program, MacDraw is only a shadow of its dedicated rivals. There are no templates, no style sheets, and—of course—no out-

---

[1] *You must use the proprietary fonts included to take advantage of No. 5's text effects.*

[2] *Acta outliner, a desk accessory, is included (but not integral to the program).*

[3] *In separate Output Manager program.*

[4] *For use when slide format changes (from transparency to 35mm, for example).*

[5] *Basic four tools are line, rectangle, rounded rectangle, and ellipse.*

[6] *Not the Shadow style—rather, an actual shadow offset slightly from the characters.*

PRESENTING..FEATURES

	Aldus Persuasion 2.0	Claris MacDraw II 1.1	Computer Associates CA-Cricket Presents 2.0	Microsoft PowerPoint 2.01	Symantec More II 2.0	Visual Business Systems VB No. 5 1.02
Price	$495	$399	$495	$395	$395	$395
Extra software included	clip art		Acta	SmartScrap		
Oversize fonts included	•		•	•		• [1]
Built-in outliner	•		• [2]		•	
Slide sorter	•		•	•		• [3]
Online help	•	•		•	•	
Service bureau driver included	Autographix		Autographix	Genigraphix	Magicorp	
Automatic graphics adjustment[4]	•					
Number of reduction levels	3	5	4	3	1	
Number of enlargement levels	2	5	4	0	0	
Speaker's notes and handouts	•		•	•	•	
Imported file formats	Acta, More 1, MacWrite 4.5, PICT, PICT2, EPS, WKS, text, PowerPoint (via Scrapbook)	PICT, PICT2	EPS, PICT, PICT2, SYLK, MacPaint, Acta	PICT2, MacPaint, EPS	Word 3, MacWrite 4.5, ThinkTank, text, EPS, PICT, PICT2, MacPaint	PICT, SYLK, EPS
Exported file formats	PICT, Scrapbook, Acta, More 1, text	PICT, PICT2		Scrapbook	Word 3, MacWrite 4.5, ThinkTank, text, EPS, PICT, MacPaint	PICT, SYLK
GRAPHICS						
Master slide layer	•	•	•	•	•	
Graduated background color	•		•	•	•	•
Automatic graphics templates	•		•			
Automatic color schemes	•		•	•		
Align Objects command	•	•	•	•	•	
Group Objects command	•	•	•		•	•
Drawing tools[5]	basic four, arc, freehand, polygon	basic four, arc, freehand	basic four, arc, diamond, parallelogram, polygon, freehand, framer	basic four	basic four	basic four, diamond, parallelogram
GRAPHING		n/a		n/a	n/a	
Automatic charting capability	•		•			•
Chart types	9		8			hundreds
3-D charts	•		•			•
Exploding pie charts	•					•
Tables	•		•			
Organizational charts	•				•	
TEXT						
Tab stops	•		•	•	•	
Leading control	•		•	•		
Search and replace	•		•	•	•	
True shadow text [6]	•					
Manual kerning			•			
Spelling checker	•	•	•	•	•	
Thesaurus			•			
Rotated text		•				•
Perspective text						•
ON-SCREEN PRESENTATIONS						
Transition effects	13	n/a	11	0	23	5
Individual slide timing	•		•		•	
Dual monitor support				•	•	
Automated builds on one slide	•				•	

liner. You can't even create on-screen presentations, because you can't hide MacDraw's menu bars and palettes. Nevertheless, MacDraw is a much better graphics program than most of the presentation packages. It might be a good candidate for a presentation of technical or architectural graphics, for example.

Don't consider MacDraw for its slide-making skills alone. But keep the program's secret extra talent in mind when you are looking for a graphics program.

Funny Business No. 5

Finally, there's a strange, nifty program called Visual Business No. 5, which runs only on the Mac II series. Strange, because it does so little: it creates business-chart slides, one at a time. Nifty, because it creates them unbelievably well. (For more on Visual Business No. 5, see *Reviews,* this issue.)

More II
Most presentation slides are text slides. More transforms an outline into bullet or tree charts, and provides a number of transitional effects for on-screen presentations.

First you choose a background color. The oddball manual suggests you "use a dark blue background, unless you are a master of color theory and the related psychology." Here's hoping that you ignore that advice, however, because No. 5 allows you to create breathtaking graduated color backgrounds.

Next, you enter data in a small spreadsheet, and the program graphs it. You choose the chart type from a menu. Then choose the 3-D command to make the chart three-dimensional, and the magic begins. Using four little buttons, you can rotate the graph in any dimension—spin it all the way around, if you want—and the program redraws it, in full color and perfect perspective. Even the graph's text labels go along for the 3-D ride, like the opening credits in *Star Wars.*

The program doesn't do much else. A companion program, Output Manager, can send your slides to assorted output devices (including the screen, if you want to make a slide show). But probably the best use of No. 5 is to export the finished charts to your main presentation program in color PICT format. Too bad you'll have to pay $395 for that privilege.

If Visual Business No. 5 sounds appealing, you should also investigate a presentation charting program that we received too late to review —DeltaGraph, from DeltaPoint, which offers additional charting capabilities and costs considerably less. Last slide, please.

Presentation Possibilities

If you make a lot of presentations, it's time to consider the persuasive arguments of these new programs. PowerPoint, the granddaddy of them all, somehow continues to do well in the marketplace, despite the fact that it's nowhere near as capable as its rivals. If you add an outliner, chart-plotting features, and graphic-design templates to PowerPoint, you have Cricket Presents. Throw in flexibility, intelligence, and powerful style-sheet-like templates, and you have Aldus Persuasion—the Cadillac of the presentation programs. If you're willing to spend some time with Persuasion's manual, you'll be rewarded with the ability to update the look, size, or formatting of your entire presentation with a single change.

In the not-really-presentation-programs category, More II is particularly attractive. A superb organizer and outliner, its presentation capabilities are enough for many kinds of presentations, especially for on-screen and interactive during-the-meeting shows. MacDraw isn't really a presentation program at all, but its new slide features will be very useful to more than a few designers and artists. And finally, little Visual Business No. 5 does some uncanny things with three-dimensional graphs. It's not much good as a presentation program, but those charts are sensational.

In some ways, choosing between presentation programs is like counting features. Before you buy, be sure to determine which product has the features you need (see "Presenting ... Features"). Remember, though, the one feature you won't find in any of the programs is a Transform-Boring-Speech command. The software gets your thoughts into finished form more quickly. The rest is still up to you.

Lights, please. Any questions? ◻

See *Where to Buy* for contact information.

David Pogue, *a* Macworld *contributing editor, lives in New York City. He recently moved into a co-op apartment, using a Macintosh presentation to convince the admissions board that he's a decent sort of fellow.*

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Company _____

Address _____

City/State/Zip _____

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HARDWARE

		MANUFACTURER	NAME OF PRODUCT	MODEL #
Alternative Mass Storage	1.			
CPU Upgrade	2.			
Digitizer/Scanner	3.			
Display—Black-and-White	4.			
Display—Color	5.			
Graphics Board	6.			
Hard Disk (80MB or Less)	7.			
Hard Disk (above 80MB)	8.			
Input Device	9.			
Micro-to-Mainframe Communications	10.			
Modem	11.			
Network	12.			
Printer—Color	13.			
Printer—Dot Matrix	14.			
Printer—Laser	15.			
Most Promising Newcomer	16.			

SOFTWARE

		MANUFACTURER	NAME OF PRODUCT
Business Accounting	17.		
Business Presentation Graphics	18.		
Communications—General	19.		
Computer-Aided Design (CAD)	20.		
Database Management	21.		
Desk Accessory	22.		
Drawing/Illustration	23.		
Education/Training	24.		
Game	25.		
Integrated Package	26.		
Micro-to-Mainframe Communications	27.		
Multimedia	28.		
Music	29.		
Networking	30.		
Outline Processing	31.		
Page Layout	32.		
Paint—Black-and-White	33.		
Paint—Color	34.		
Personal Finance/Tax	35.		
Programming Language	36.		
Project Management	37.		
Spreadsheet	38.		
Statistics/Math	39.		
Utility—Disk and File	40.		
Word Processing	41.		
Most Promising Newcomer	42.		

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REVIEWS

Video Production Boards for the Mac II

COLORSPACE IIi 3.0 AND COLORSPACE FX 3.0

Pros: Provides a nearly complete hardware video package; displays full-screen, real-time video on Apple monitor; displays video and captures frames in 24-bit color. **Cons:** Expensive; difficult to install; poor documentation. **Company:** Mass Microsystems. **Requires:** Mac II; 2MB; Apple or Multisync color monitor. **List price:** ColorSpace IIi $2299; ColorSpace FX $3499; monitor-specific cable $100.

MARK JOHANN

There are some very good reasons you can't watch TV on your Mac. For example, the picture on a television is created by two rapidly alternating sets of scan lines that constitute an *interlaced* or NTSC signal; a computer monitor is "painted" in one continuous pass, using a non-interlaced or RGB signal (for a more complete discussion of these issues see "Mac TV Tools," September 1989). Until recently, this incompatibility has prevented the Macintosh from being used as a desktop video tool.

To create a workable Macintosh video setup, you need a videotape or videodisk player (or camera) to provide the raw video image; an NTSC-to-RGB decoder to see the TV picture on your Mac; software that lets you process the incoming signal (to provide transition effects, add animations, or superimpose titles on top of the TV image); genlock circuitry to synchronize the video and Mac images; an RGB-to-NTSC encoder to turn the Mac signal back into TV (NTSC) format; and finally, a second videotape recorder to capture the resulting TV-plus-Mac-graphics picture. You might also want a frame grabber (video digitizer) to capture still images from the video at any time.

Several boards provide partial solutions to this complicated equation. However, none so far has been capable of displaying full-color, full-screen, real-time video on a standard Apple color monitor (they usually require a costly computer-and-TV monitor called a multisync monitor). And few have attempted to combine all of the various elements of the encoding-decoding chain into a single product.

Pick a Card

Now, however, Mass Microsystems has introduced the ColorSpace IIi and ColorSpace FX boards. There are enough good engineering ideas in these boards to take Mac video production a significant step forward. In essence, these boards consist of signal encoder-decoders, genlock circuitry, digitizing features, a live video display board with 24-bit color, and a Macintosh graphics display board with 8-bit color—all rolled into a single package.

The significance of having one display circuit for the video image and another for the QuickDraw elements of the Mac environment is that you can view the incoming video image on a standard Apple color monitor. The picture is outstanding (that's a compliment to the monitor as well as the boards); the live video appears in 24-bit color no matter which Apple color board (4-bit or 8-bit) you normally use. The ColorSpace software lets you watch color TV while crunching numbers in Excel. And not just in a window in the corner of the screen—you can use the full screen area of the Apple monitor to display "L.A. Law" while you're working on the annual report.

That's the Key

Fortunately, ColorSpace boards can do far more than turn a Mac into the world's most expensive TV set. To specify where you want to see the video image, you can select a key color using the ColorSpace software. A key color works just like the chroma-key system in TV studios—anywhere the specified

color appears on the screen, it's replaced by the video image.

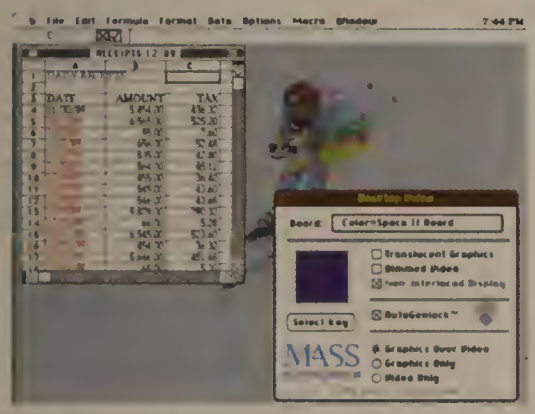
Say you draw a blue rectangle in MacDraw and designate blue as the key color. You don't see a blue rectangle at all. Instead, you see a rectangular slice of the incoming video image. If you use Canvas's airbrush to spray a blue spatter across the screen, you create the effect of wiping fog off a TV screen to reveal the TV picture underneath. If you select the background color of the Mac desktop as the key color, you see the icons and windows suddenly sitting atop a full-screen, full-color, real-time video picture.

Once you understand this concept, you can see how easy it is to superimpose graphics or animations over the video picture; your second videotape player will record the resulting combined image. Using any color program, fill the background with the key color and add titles or other graphics using any other colors. Or make the text the key color, and the video actually plays within the letters themselves.

HyperTV

Another useful part of the ColorSpace system is that the FX board responds to various HyperCard (or SuperCard) XCMDs to process the picture. By clicking an on-screen button, for example, you can flip the live video upside down, posterize the colors, spin the video image along a bezier-curve path of your choice, and so on. Because you have a choice of three video inputs, you can use these commands as transitional effects from one video source to another—to cut from one camera to another, for example.

To take advantage of these powers, you need some proficiency in HyperTalk programming; otherwise, you'll have to use the ready-to-go effects provided in the ColorSpace FX stack. Those fluent in HyperTalk can design special visual effects using the ColorSpace XCMDs as building blocks.



Using the Desktop Video desk accessory (left), you specify the key color. The entire desktop displays the live video image.

Multimedia Machine

The ColorSpace boards definitely are not aimed at the home user. First of all, their combined list price is nearly $6000. Second, the boards' setup isn't as simple as you might hope, and the manual isn't much help (for example, figure 2-3 is an empty box labeled "TO BE DRAWN"). A VHS cassette tutorial takes you carefully through board installation, but then abandons you at the crucial point—setting up video sources, monitors, and cabling.

Remember, too, that you'll probably want to buy both boards together. The ColorSpace IIi itself lets you overlay Mac graphics on the video signal and capture still images. But it's the ColorSpace FX that provides most of the best features—the ability to resize the video image, use your Apple monitor as a display, process the video image with special effects, and achieve a stable, flicker-free image at all times.

On the other hand, these boards provide a compact, integrated video package for presenters and creators of interactive videos (such as self-running, videodisk-based trade-show displays). In-house corporate video productions also stand to gain much. And Mass Microsystems reports that some cable and independent TV production facilities are using the boards for broadcast work. (Unfortunately, the boards don't work with some popular multisync monitors; if you already own a monitor, be sure to call Mass Microsystems before you buy.)

Hard and Soft

The ColorSpace boards are very good. But no matter how good they are, they're only one tool in a video toolbox and don't represent a complete desktop video system. Like other video boards, the ColorSpace boards sorely lack some mechanism for controlling video decks attached to them. There is still no readily available software or hardware to control videotape players, for example—you have to roll the source tape and hope to roll the capturing tape at the right moment.

Still, the ColorSpace boards provide enough carefully written software to achieve a number of useful effects and enough HyperCard XCMDs to provide a starting point for more customized effects. Desktop video will probably never catch fire as an everyday Mac buzzword; it's too expensive and too complicated. But the ColorSpace boards provide a more complete, moderately priced package than any product currently available.

—David Pogue

Thanks to Sam Edwards and David Poole for their technical assistance.

See Where to Buy or circle 710 (ColorSpace IIi), 709 (ColorSpace FX) on reader service card.

Database

4TH DIMENSION 2.0.6

Pros: Powerful and flexible application generator; superb development environment. **Cons:** Has problems in multiuser mode with TOPS and Liaison. **Company:** Acius. **Requires:** Mac Plus; 1.5MB RAM recommended if using MultiFinder; hard disk. 68020 CPU recommended. Requires System 6.0.3. **List price:** $795.

It was billed in advance by Guy Kawasaki as the "most ambitious software upgrade in the history of the Macintosh," and I was eager to find out whether 4th Dimension's long-awaited second version was worthy of such hype. I found that version 2.0.6 of 4th Dimension (4D) is both faster and easier to use than the original and that most common database operations can now be accomplished without programming. Although it falls short of the prerelease hype, Acius's latest database manager and application generator is arguably one slick upgrade.

Performance

The first version of 4D won many accolades for its superb user interface and design environment, but these features required high-powered hardware and plenty of RAM in order to perform adequately when working with com-

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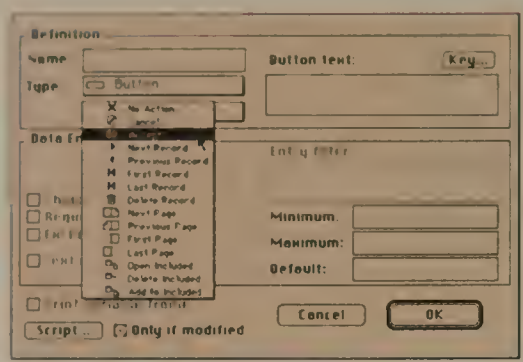
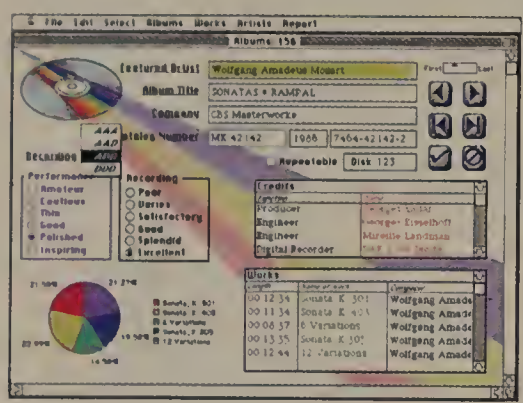


Making a Button

The Object Definition box allows you to specify what action you want a newly created button in a layout to do. Any action in the pop-up menu can be assigned to the new button by double-clicking on the desired item. Clicking on the Script button in the lower left corner lets you write a custom script that will be executed whenever the button is clicked.



CD Base

4th Dimension 2.0.6 allows you to create full-color layouts that include radio buttons, pop-up menus, scrollable areas, and included layouts.

plex databases (see "Working in the 4th Dimension," *Macworld*, May 1988). With the new release, the time required to perform most database operations has been reduced by about a factor of between two and five (see "4th Dimension 2.0.6 Advantage"). Some of these improvements were achieved by reducing the number of separate desktop files maintained by 4D from six or more to only two; others were obtained from changes in the way the program deals with data internally. The most dramatic improvement in performance is in importing data, an operation that was ridiculously slow in 4D's first release; version 2.0.6 imports data 14 times as fast. Although performance on machines with a 68020 or 68030 processor is now on a par with most other relational databases available for the Mac, 4D is still uncomfortably sluggish on a Mac Plus or SE. Furthermore, since 4D tends to generate large files and because the program reads and writes to disk often during its operation, a large, fast hard disk is essential to maximize performance. Another way to increase performance is to minimize disk access by providing more memory, but you'll probably find that both a fast hard disk and lots of RAM are necessary to get acceptable performance when working with complex databases.

Version 2.0.6 isn't just faster, it's simpler to use. In its first incarnation, 4D justifiably earned the reputation of having a steep learning curve; to make full use of the program you had to write code using 4D's built-in programming language. In version 2.0.6 many commonplace features are automated so novice or casual designers don't have to learn to use the internal language. Automatic bidirectional relational links between files, included layouts (forms within forms), and a multitude of other features like ready-to-use buttons can all be implemented by pointing, dragging, and clicking (see "Making a Button" and "CD Base"). New editors for generating mailing labels and reports have also been added.

Version 2.0.6 also offers experienced programmers a host of new and enhanced capabilities. These include a For looping structure that's at least twice as fast as a While loop, enhanced scrollable areas, advanced array management, improved handling of lists and color, and the ability to attach scripts to objects like buttons or icons on a form layout. With the power and flexibility provided by these additions, 4D rivals the best database software available for any computer, including minicomputers or mainframes.

Although 4D supplies all the tools to build applications that look and feel like other Macintosh programs, the program itself deviates from standard Macintosh user guidelines in a few bizarre ways. For example, once created, a data file or field can't be deleted. Acius says it has no plans to permit the deletion of files or fields in the near future and suggests that you leave excess files or fields alone and cannibalize them as needed when new ones are required. Another anomaly is that when you make changes to a full-page layout of a subrecord and then click on the Cancel button, whatever changes you made to the layout are still accepted. Again, Acius has said it has no plans to "change the functionality" of this situation. The only workaround is to write a program for the parent form that checks to see if the Cancel button is clicked, and when it is, reset all values for the affected subrecord back to what they were before the subrecord was edited. One final example is that 4D doesn't monitor the status of an ImageWriter printer unless you write the code to handle it yourself. Thus if you send a print job to an ImageWriter that's turned off or been taken offline, 4D will merrily proceed to print without even informing you there's a problem.

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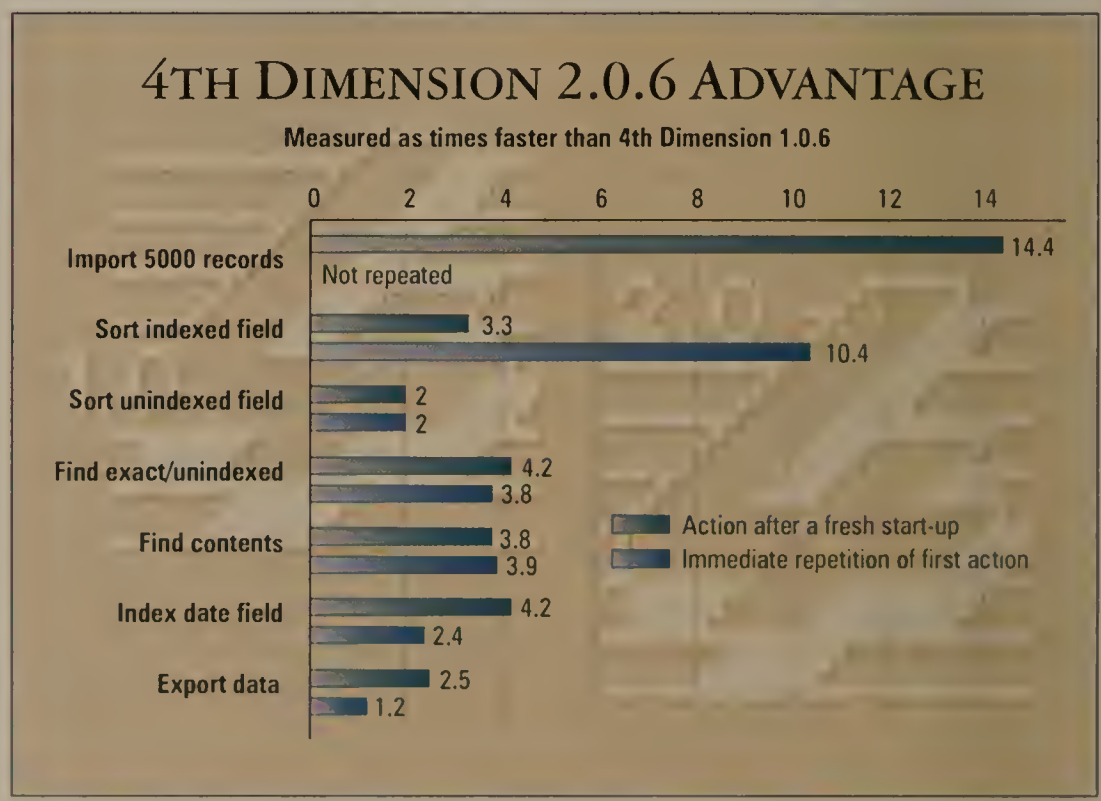

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Circle 382 on reader service card

Multiuser

A properly designed 4th Dimension database can be accessed simultaneously by several users over a network. In my hands, multiuser operation over LocalTalk using the AppleTalk networking protocol was improved over that of version 1.0.6 but still sluggish at best. Some 4D developers have reported getting much better results using a PC-based 3Com Ethernet server. To improve performance you can place a copy of the structure file for a database on the hard disk of each node. The remote application can then retrieve layouts and procedures from a local hard disk, thereby reducing network traffic. However, should you ever wish to alter the structure of the database, you'll have to change all of the remote structure files as well.

As this review was being prepared, Acius was promising the release of an inexpensive run-time version compatible with version 2.0.6. If you intend to use 4D on a network, you should be aware that developers have uncovered incompatibilities between the initial release of version 2.0.6 and common networking software such as TOPS and Liaison. So check with Acius to ensure that your networking setup is compatible before you buy.

Support

Unlimited free assistance is available from Acius through a telephone help line (not toll free). Novices and experienced developers alike can also get quick help in programming 4th Dimension from Acius representatives and from other developers by accessing a very active CompuServe electronic bulletin board.

An Excellent Choice

If you're looking for a database that's easy to put to work right away yet still powerful enough to grow into, 4th Dimension is an excellent choice provided you have a machine with sufficient power and memory, and a hard disk fast enough to drive it. When the compiler recently announced by parent distributor ACI in France becomes available in the United States, 4th Dimension could become all the justification you need to buy a Macintosh.

—David L. Foster

See **Where to Buy** *or circle 702 on reader service card.*

24-pin Printer and Macintosh Interface

TOSHIBA P321SLC

Pros: Produces high-speed, near-laser-quality text; also prints 360-dpi graphics and color. **Cons:** Noisy; slow for high-resolution graphics or color. **Company:** Toshiba America Information Systems. **Requires:** Mac Plus; hard disk. **List price:** $899; MacMatrix (includes printer driver, font sets, and cable) $49.

A few years ago, Apple Computer created a unique opportunity for printer makers. By allowing the ImageWriter LQ to remain on the market as one of the most complained-about products ever seen, it gave other makers of 24-pin printers a chance to offer Mac users something that would almost certainly outperform Apple's own offering.

Now Toshiba is offering a printer-and-interface package in which everything has been done right. In particular, it solves one problem that has troubled other manufacturers: Toshiba found, at GDT Softworks, a printer driver that's been around long enough to have been thoroughly debugged. GDT's Mac-Matrix (which includes the printer driver, font sets, and cable), as repackaged by Toshiba, allows you to use your Macintosh applications with no special precautions or modifications, a rare feat in the world of non-Apple printers. In addition to this, the P321SLC is itself an excellent piece of hardware, already well received on the IBM PC side of the fence. The whole point of a 24-pin printer is to combine speed with letter quality, and the P321SLC delivers.

MARK JOHANN

The Toshiba P321SLC

Configurations

Installing the printer is a bit of work—as shipped it has no Mac-specific settings. In a little LCD window, you pick emulation mode, buffer size, serial interface, protocol, baud rate, parity, and stop and data bits. This procedure can be confusing because you are confronted with a number of extra settings the direction card says nothing about (though you can ignore these and all is well). Besides this card, you have a helpful MacMatrix manual and a fat Toshiba manual with more information than you're likely to need, including a chapter of IBM-specific software hints.

Software installation is straightforward—it's nearly the same for all non-Apple printers. You install a set of provided printer-resident fonts with Font/DA Mover and load a set of supplied outline fonts into your System Folder. You also drag a Toshiba CDEV to the System Folder, and select the printer in the Chooser. The resident fonts are fast (timed at 200 characters per second on Microsoft Word documents) but limited: 12-point Courier, 10-point Prestige Elite, and 10-point High Speed Draft. The outline fonts in the MacMatrix package are called TMS Roman, Helvet, Courier, and Symbol. When you select a font in one of these four fami-

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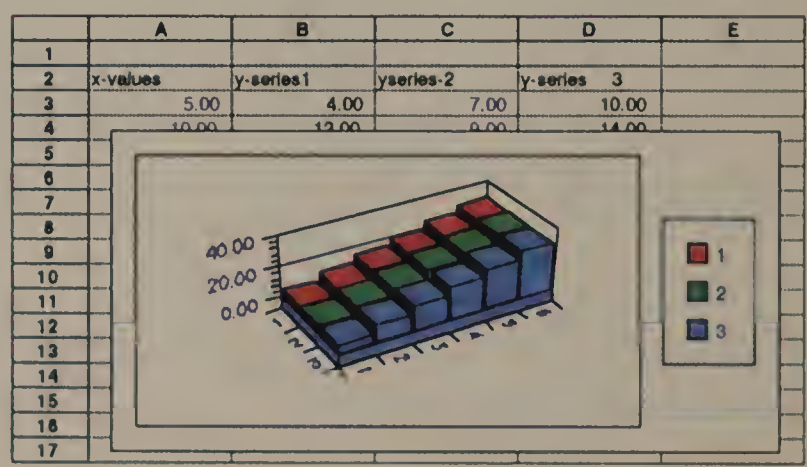
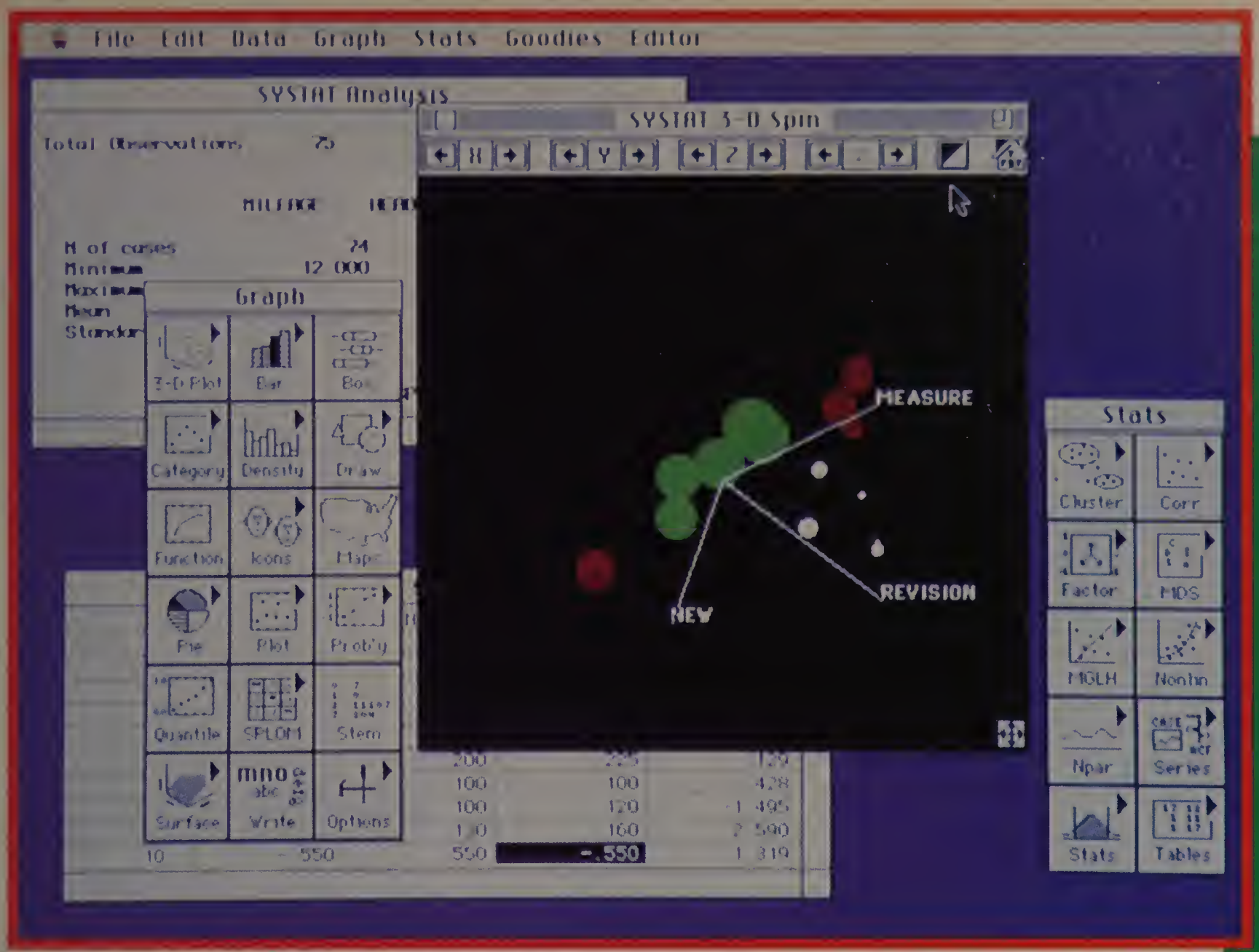


The Business of Color

This 3-D chart from Wingz 1.1 shows the printer's tasteful substitutions for the gaudy fluorescent on-screen colors. Now, if there were only low-cost color photocopying.



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Circle 492 on reader service card

lies from a Mac menu, the software selects its own outline font for printing (Helvet for Helvetica, TMS Roman for Times), even though you've selected the font with the more familiar name. In other words, the software works behind the scenes to give you the best possible print quality; you don't even really need to know how it does it.

Both printer-resident fonts and MacMatrix outline fonts give you exceptionally clean printing, and the outline fonts can be scaled from 6 to 127 points with no degradation. For other fonts, the printer driver reproduces the screen bitmap image—if you've made a font choice that looks ragged on screen, you'll get faithful hard copy with crisp staircase edges on your large capital A's.

Picture This

The printer says three-in-one right on top, by which Toshiba means capabilities for fast draft printing with resident fonts, black-and-white graphics printing (implicitly, Mac outline and bitmap-font text printing as well), and color printing. Graphics for the Mac are printed at 180 by 180, 180 by 360, or 360 by 360 resolution. As you might expect, 360-dpi printing is slow, but the nearly identical 180-by-360 output is almost four times faster. Color printing, although much slower, gives eight vivid colors. It's also easy to use—just snap in the Toshiba color ribbon, invoke color from your application where you want it, and check color in the Page Setup and Print dialog boxes. It's slow though; it takes 12 seconds to print one page of a Wingz spreadsheet (text and numbers) using one of the printer's letter-quality resident fonts. Printing a page of the same spreadsheet including a high-resolution color chart that takes up about one-third of the page requires 9 minutes and 10 seconds (see "The Business of Color"). During this interval, the printer also does a high-decibel rendition of the screams of a tortured gerbil as all 24 pins are furiously pounding away. And make sure you have the color option turned off for plain black-and-white printing, since it extracts a severe speed penalty.

The Printout

The P321SLC is a versatile printer with sharp output in both black and white and color. If you need the ruggedness of a well-designed dot matrix printer, it's an excellent choice. With a relatively high retail price and high-quality output, it's not really competing with other dot matrix printers but with systems such as the Hewlett-Packard DeskWriter ink-jet printer and low-end non-Apple laser printers. But if you typically need to bang out lots of material for review in draft mode before printing final documents and have habituated yourself and your home and office neighbors to dot matrix noise, the P321SLC's virtues will win your heart.—**Charles Seiter**

See Where to Buy or circle 809 on reader service card.

Surgical Simulation Game

LIFE & DEATH 1.01

Pros: Challenging and educational. **Cons:** No color; game in progress can't be saved. **Company:** The Software Toolworks. **Requires:** Mac Plus. **List price:** $49.95.

Nowadays it seems as if nothing comes without some kind of a warning. The folks at Software Toolworks caution you not to try Life & Death if you're faint of heart—a wise move. If the embossed photo of a bloody brain on the box doesn't get to you, the challenge and frustration of playing the game just might.

Mac General

Life & Death comes with four pieces of documentation, including a delightful pamphlet on the history of surgery. The surgical mask and gloves are a nice touch and handy if you have to do any painting around the house.

Life & Death begins in a hospital corridor, complete with nursing station, patient rooms, and doors leading to the operating room (O.R.) and staff room. After signing in with Monica, the nurse on duty, you're assigned a patient to examine. During the first few minutes, your beeper is bound to go off. Unless you answer by dialing the correct number, you'll be penalized later on. This has nothing to do with the rest of the game, so it's remarkably annoying, just like the real thing.

MARK JOHANN

A click on the doorway to the patient's room plants you at the foot of the bed. After reading the history from the chart, it's time to examine the patient. During the rudimentary physical, you get to press on the patient's abdomen and listen to the patient's comments. A few seconds of probing are usually enough to determine if surgery is required. If you are still not sure, you might have to order an X ray or ultrasound scan to confirm your suspicion. This is the most simplistic and least challenging aspect of Life & Death, but you quickly learn to zip through it.

Life & Death lets you perform two operations: beginners get to tackle an appendectomy, while more experienced surgeons are faced with a complex aortic-graft procedure. Once inside the O.R., you're responsible for everything from prepping the patient and turning on the anesthesia to suturing (see "Making the Cut"). As you dissect through the layers of tissue, you have to clamp and cauterize bleeding vessels. From time to time, you're expected to treat heart irregularities with injections of medication. The simulation is tricky and surprisingly realistic, apart from the lack of color

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Making the Cut

A critical moment in the O.R.: as you work, members of your surgical team give you hints and advise you of complications.

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(red and white would do just fine).

Life & Death is awfully finicky about the way you go about your chores in the operating room. If you don't do precisely what the program wants, it kicks you back to medical school for a refresher course. And since you can't save an operation in progress, you're forced to start from scratch every time. The manual isn't much help—some of the surgical steps are listed in the wrong order or aren't explained in enough detail. The game can be thoroughly aggravating at times.

Despite the frustration, I'm willing to admit that I was pretty satisfied with myself after completing both operations. Life & Death won't put any residency programs out of business, but it can be educational for anyone interested in surgery. So if you need a break from zapping aliens or MiGs—and your heart can take the strain—give Life & Death a try. It'll make your mom happy.—**Franklin N. Tessler, M.D.**

See **Where to Buy** *or circle 753 on reader service card.*

Indexed Database Toolbox for HyperCard

HYPERHIT 2.2

Pros: Stores SND, PICT, and text files. **Cons:** Hierarchical structure not as flexible as relational systems; requires advanced skill with HyperTalk. **Company:** Soft-Stream International. **Requires:** Mac Plus; HyperCard. **List price:** $195.95.

HyperHit is a set of XFCNs (external functions) that lets you create and manipulate indexed records from within HyperCard. These 40 commands enable you to open, close, and create files; read, write, and rewrite text, PICT, and SND files; create keys (references that access records) and use those keys for searches; and convert and handle data. While HyperHit can be used only within HyperCard and all HyperHit XFCNs must be embedded in a HyperTalk script, HyperHit files are not stacks.

The Key Difference

The big difference between HyperCard stacks and HyperHit files is HyperHit's use of *keys*. HyperHit files are made up of distinct records, each of which has one or more keys. A key can be a sequence number, such as a customer number, or part of a field, such as the zip code or the first six letters of the last name. The only way to search for a record in HyperHit is through its keys. HyperCard stores data as a continuous string of text within a stack. You can search for any character set within a HyperCard text string.

When you create a HyperHit database, you must define three parameters for each keyset: key length, which must be the same for all keys in the keyset; whether or not duplicate keys are to be allowed; and whether or not subordinate keys are to be allowed.

The duplicate-key option prevents you from assigning the same customer number to two clients, but clients can have the same zip code.

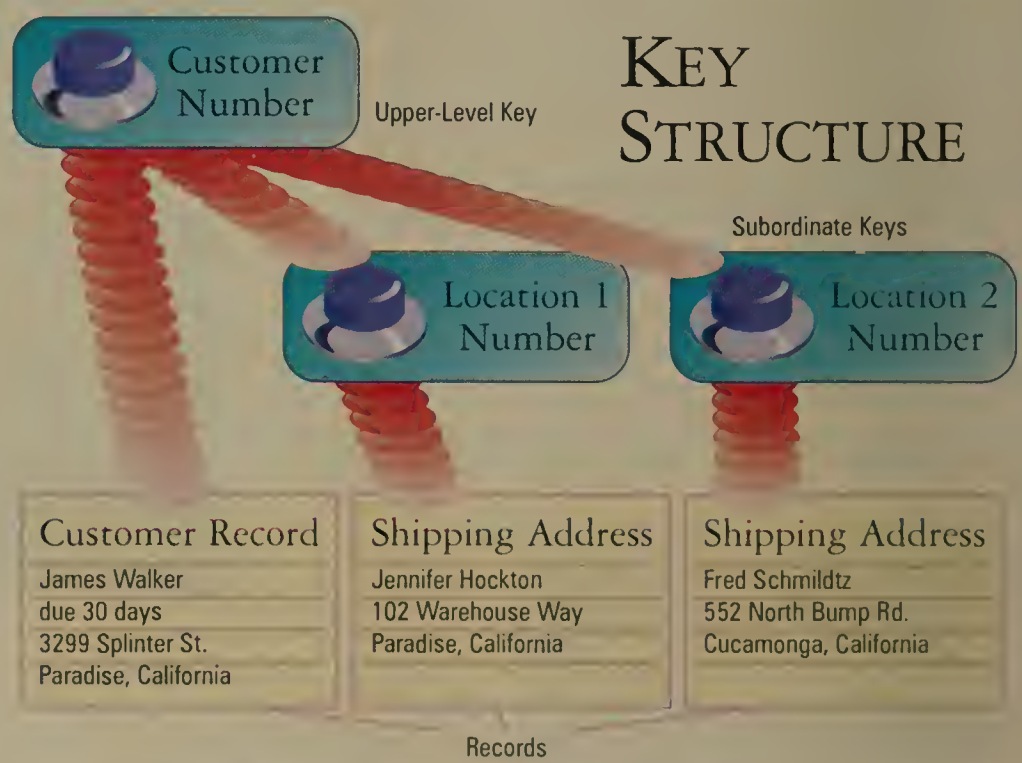
Subordinate keys allow you to create a hierarchical database. For example, if a customer has five different receiving locations, you could create a database in which the upper-level key is a customer number that points to a record containing the main customer information, such as billing address and sales tax status. The database could then have a subordinate key for each shipping location.

Keys can also be used independent of records. For example, you can create a key that is made up of department numbers with no attached set of records. If you want to ensure that users type a valid department number into HyperCard, you can have HyperHit compare the number entered to the key and display an error message if there's no match.

Using keys makes access fast. It takes HyperCard approximately 20 to 30 seconds to search a database with 700 records, but HyperHit takes less than 1 second. Unfortunately, you are limited to searching by the keys you define when you set up the system. So if you are using last name and zip code as keys, you cannot search by street as you can in HyperCard.

Choosing between HyperCard and HyperHit is a relatively simple matter. HyperHit should be used for large databases where HyperCard would be too slow. Additionally, if you want to store data in multiple files, HyperHit allows you to have as many open files as memory can accommodate. HyperCard, of course, allows only one stack to be open at a time. If, on the other hand, you have 200 or 300 short rec-

(continues)



This diagram represents a hierarchical key structure. Each upper-level key (customer number) points to a customer record. The record contains general customer information such as name, address. Each upper-level key also points to a set of subordinate keys containing the customer-location number. Each location key accesses a record that contains the shipping address.

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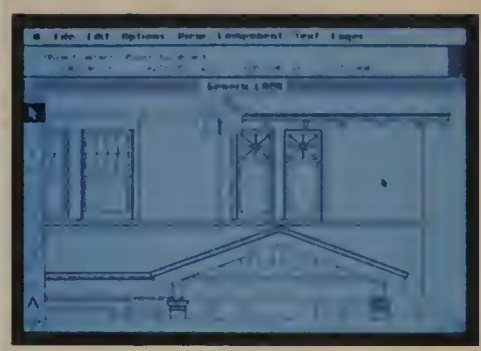

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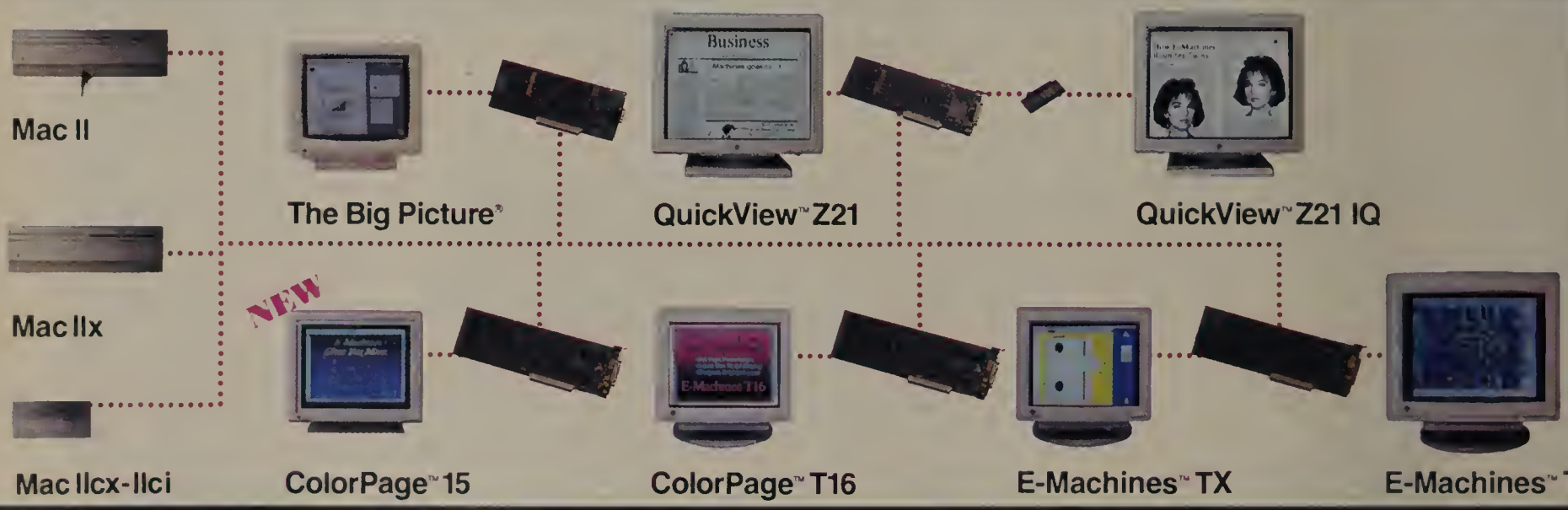

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ords in your database, HyperCard is easier to set up, and it searches whole records—often an advantage.

Another HyperHit disadvantage is that it is hierarchical rather than relational. Hierarchical systems require that you set up the types of searches you will want to perform ahead of time. Relational systems, which do not use keys, allow you to do ad hoc searches using Boolean (AND/OR) logic on any field.

Ease of Learning

All powerful database programs have a steep learning curve, but because HyperHit requires that you be proficient in both HyperTalk and HyperHit, it can be doubly difficult to learn.

HyperHit comes with scripts that can be used as a reference for creating and searching simple one-key databases. But beyond that, you're on your own. HyperHit can greatly increase HyperCard's speed with large stacks while maintaining the HyperCard user interface. HyperHit is an excellent tool for developers or anyone who is willing to acquire the skills to become one.

—Lawrence Stevens

See **Where to Buy** *or circle 744 on reader service card.*

Certificate Production Software

TOP HONORS 1.02

Pros: Uses EPS graphics. **Cons:** Limited graphics usage, not Suitcase-compatible, non-standard printing method.
Company: Springboard Software.
Requires: Mac Plus; PostScript printer.
List price: $99.95.

There's nothing like an attractively designed, personalized certificate to jazz up an office or make someone's day. Top Honors from Springboard Software was created to produce simple certificates quickly and easily and to take advantage of high-quality EPS graphics and downloadable PostScript fonts.

Easy Does It

Top Honors comes with two certificate templates, three files of graphics, borders and seals, plus a special decorative font, Old German, that you can use to make ornate certificates.

The "505" Club

Shown here is a close-up of the seal and border patterns used to create a certificate. Notice the two lines of added text I used to customize the seal.

To create a certificate, you simply choose New Certificate from the File menu and choose portrait or landscape orientation from the Certificate Format dialog box. You then see a blank certificate on screen that consists of border, title, body, signature, date, and graphic areas. Each of these elements—except, of course, the border—is an independent element that you can move; but the certificate template actually lets you produce a professional-looking certificate on the first try.

To enter text to the title, body, signature, or date sections of a certificate, you double-click on one of those sections; this brings up a dialog box specific to that part of the form. For the title, for instance, you see a series of blank lines and three formatting options: lines of parallel text; one curved, centered line of text over two straight lines; or curved lines bracketing one line of straight text. You have access to any downloadable PostScript font resident in your connected laser printer (provided that font is no larger than 50K). If you don't have a laser printer connected, you have access to Courier, Helvetica, and Times-Roman.

To add a border pattern, you double-click on the border area of the template and select one of the 24 patterns that come with the program. These patterns range from ornate roses to spare Art Nouveau curlicues and should offer something for everyone.

You're limited, however, to the use of only three graphics: one seal, one EPS graphic, and one MacPaint-format graphic. To add the first of these, you can double-click on the graphic area at the lower right of the certificate template, which opens the graphics dialog box. There you can either select one of the ten EPS graphics that come with the product (ranging from books to crests, charts, crosses, eagles, and other emblematic artwork), choose one of the seven seals also included with the product, or import an EPS or MacPaint file of your own.

To add the remaining two graphics you choose Add Graphic from the Graphics menu. If you choose to import a MacPaint graphic you can use the grabber hand, the marquee, or the lasso tools in the Add Graphic dialog box to select only that part of the graphic that you want to import. For a really fancy effect, you can even set the gray scale of the EPS graphic you're using, so that it looks like a watermark in the certificate's background.

To each of the supplied seals you can add two lines of your own curved text, although you're limited to 35 characters on each line.

Wild Cards

To print a set of certificates, you can use Top Honor's wild-card feature. Instead of entering an individual's name in the body of the certificate, type name to indicate that you'll be working from a list. Then select Create Name List from the File Menu, and enter the list of names. When you print out a certificate with the name in it, the program prompts you to select a list of names and asks you to select individuals on that list or Select All.

One problem I had was that the program doesn't allow access to screen fonts installed via a resource manager such as Suitcase or MasterJuggler. And I had trouble printing certificates when Suitcase was installed. I had some problems getting my initial certificates to print, but I received good technical support from Springboard Software.

For a simple, easy-to-use certificate maker that takes advantage of PostScript-quality graphics and text, I give Top Honors, well, top honors.

—Chris Ferino

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Video Frame Grabber

NEOTECH IMAGE GRABBER 1.8

Pros: Versatile image processing tools; supports multiple file formats; extensive halftoning options; compatible with NTSC and PAL video standards. **Cons:** Some functions irreversible; not compatible with all video cameras. **Company:** Advent Computer Products. **Requires:** Mac II; 8-bit video board. Hard disk recommended. **List price:** $1499.

The Neotech Image Grabber adds to the growing list of frame-grabber boards for the Mac II (a companion product for the SE lists for $1249). Once you become accustomed to the Neotech software's odd user interface, the hardware does an excellent job of capturing video images in black and white.

Plug and Play

The Neotech board slips into any open NuBus slot and connects to a video source (usually a camera or VCR) using a standard RCA-type connector. The Image Grabber can digitize a video frame in 1/30 second and is compatible with both NTSC and European PAL standards. Although captured images are black and white, a software-selectable color filter enables you to work with color sources. The board isn't compatible with older cameras that don't produce synchronization pulses with the video signal. The 2.5mm socket lets you initiate image capture with an external trigger.

Freeze Frame
This scene was recorded on a VHS camcorder and captured from videotape. The Tone Graph window under the tool palette shows the distribution of gray values in the image.

MARK JOHANN

Advent Computer's Neotech Image Grabber

The language and spelling in the Neotech manual clearly show the product's British heritage. The text is interspersed with lots of well-illustrated examples, and sections on video technology, image printing, and halftoning are included.

The application's user interface is a bit peculiar: I had trouble remembering the purpose of each of the icons in the tool palette, for example. More seriously, you can't fully undo some functions, and you are not always warned if you close a file without saving changes. But once I got used to the software, I began to appreciate its extensive complement of features.

The program operates in two basic modes. In Released Mode, the Mac displays live video, updated at about 5 frames per second. You can adjust brightness and contrast manually, or choose the Automatic Exposure control to optimize settings automatically. When you're ready to save a scene, a click on the capture icon freezes the current video frame and switches the program to Captured Mode.

The board won't digitize from a VCR on pause, but you can usually get good results on the fly. If you're working with a stationary subject, the Multi-Grab feature lets you average up to 256 frames to smooth out noise in the video signal. For those who prefer to import images directly into an image processing application, the Image Grabber comes with plug-in acquisition modules for Letraset's Image Studio and Digital Darkroom from Silicon Beach.

In Captured Mode, an impressive array of image-manipulation tools becomes available through palettes and menus. In addition to offering the usual flip, rotate, invert, and posterize functions, the program provides tools for altering the tonal balance of an image. You can centralize gray levels around a chosen value, for example. While tinkering, you can display a histogram of gray values in the whole image or any part of it (see "Freeze Frame"). A set of seven editable convolution filters (including sharpening and edge tracing) rounds out the list of functions.

Getting It Out

Images can be saved in a variety of file formats, including encapsulated and plain PostScript, TIFF, RIFF, PICT, PICT2, and MacPaint. The Image Grabber application gives you extensive control over halftoning options for saving to a PostScript file or printing directly to a PostScript printer, letting you adjust screen density and angle, dot pattern and gain, and rotation.

All in all, the product does its job well. I obtained consistently good results with a color camera and a VCR. If you're in the market for a high-quality black-and-white digitizer, I highly recommend the Neotech Image Grabber.

—Franklin N. Tessler

See Where to Buy or circle 770 on reader service card.

MIDI Sequencer Software

DELUXE RECORDER 1.0

Pros: Full featured; screen interface is unusually intuitive. **Cons:** Sluggish response to many commands; changing settings while a song is playing occasionally causes notes to stick or the program to crash. **Company:** Electronic Arts. **Requires:** Mac Plus; System 6.0.2; MIDI interface; MIDI sound source and controller. Hard disk recommended. **List price:** $149.95.

Stepping squarely into the breach between professional MIDI sequencers and bare-bones shareware, Electronic Arts' new Deluxe Recorder combines enough musical sophistication to satisfy most serious electronic musicians at a price even amateurs can afford. Unfortunately, sluggish screen performance and a significant playback bug mar this otherwise excellent program.

A Sequential Melody

In case you're unfamiliar with the electronic musician's lexicon, a *sequencer*

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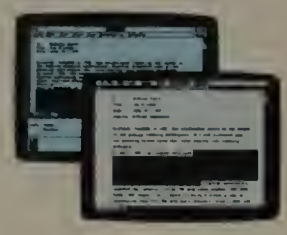

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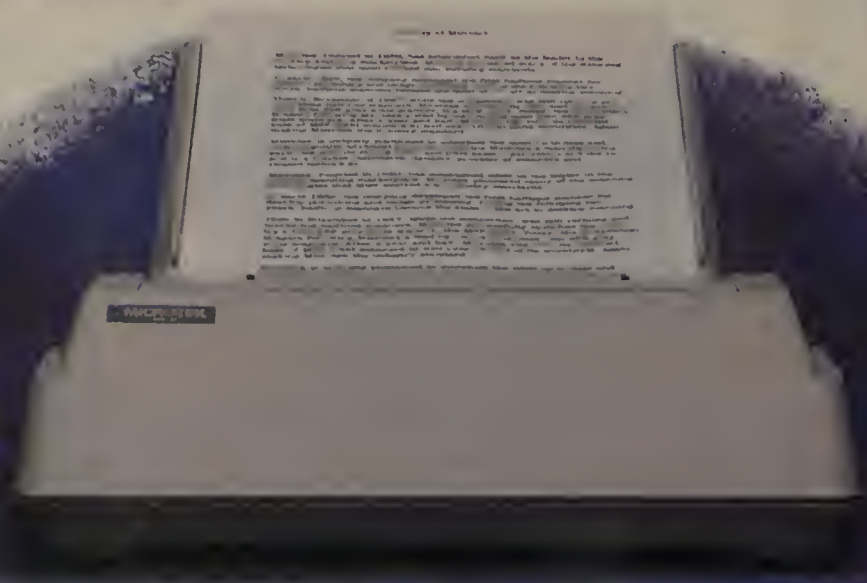

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is computer software, or a hardware device, for recording and playing back music from synthesizers and other electronic musical instruments. Sequencers are like multitrack tape recorders in that you can record on multiple tracks all at once or one at a time, mix music from several tracks, and dub new music on top of an earlier recording. However, instead of picking up the sound of the music itself the way a tape recorder does, a sequencer records a set of instructions for re-creating the music on synthesizers and drum machines. Since you need actual instruments to replay the completed song, or sequence, it has more in common with a player piano roll than with a tape recording. A sequence is stored in the form of a stream of digital data that specifies when each note begins playing, how long it lasts, how loud it's to be, and other nuances. The right sequencer software lets you change a song's tempo, pitch, and notes by editing this data to your heart's content—something you could never do with a tape recording or a piano roll.

Like most sequencers, Deluxe Recorder relies on the visual metaphor of a tape deck control panel for basic operation; the console window offers play, rewind, and fast-forward buttons, and a counter showing where you are in the song (see "Central Console").

The program lets you record on 16 separate tracks, fewer than more expensive sequencers provide, but plenty for all but the most complex compositions. In contrast to some low-end sequencers, Deluxe Recorder records all types of MIDI data and can filter out any kind of data you don't want in your sequence. The program comes with a utility that transfers sequences

MARK JOHANN

Central Console

In the console window you can see the tape deck–like controls at the top and under them a list of the song's tracks. The edit window at the bottom of the screen lets you see and edit your musical data.

to and from Electronic Arts' music notation program, Deluxe Music Construction Set; the utility can also exchange sequences with other programs via standard MIDI files.

MIDI Magic

Despite its low price, Deluxe Recorder delivers a surprisingly complete set of editing tools. Like every sequencer I know of, you can have the program correct or quantize rhythmic errors so that the beginning of every note falls on an even division of the beat. But Deluxe Recorder's version of this feature is nearly as flexible and sophisticated as you'd find in the best Mac sequencers. You can quantize the length of the note separately, you can quantize to any tuplet value you can dream up (13 notes in the time of four, for example), and you can even half-quantize to preserve some of your human imprecision. Each track has its own edit window in which you can alter notes or almost any type of MIDI data individually or in selected groups, copying, moving, or deleting them, or penciling in new data from scratch.

A lot of thought went into designing Deluxe Recorder's screen controls to make altering myriad musical settings easy and fast. To change a track's volume, you press the mouse button on the volume setting to pop up a slider, then slide to the new volume and release the button. To play a track using a different synthesizer sound, you select the sound from a pop-up list. You can change any aspect of the music while your sequence is playing, so you can experiment with tempo, mix (track volumes), transposition, sound combinations, and so on.

Deluxe Recorder even offers a few features that aren't widely available on the high-end packages. While most sequencers are content to refer to synthesizer sounds by their number in the MIDI coding system, Deluxe Recorder lets you title your sounds in advance so you can select them by name, instead. A rubato feature lets you record a bass line or improvisation in free time, then tell the program where you want the beat to fall so that accompanying tracks follow along in sync. One simple advantage Deluxe Recorder enjoys over other Mac sequencers is its lack of copy protection—you never have to worry about interrupting your muse to wait for a replacement master disk.

What You Can't Do

Although Deluxe Recorder can hardly be faulted for leaving out some of the advanced features available on the expensive programs, you should know what you'll be giving up. Although you can loop any portion of the entire sequence so that it plays repetitively, you can't loop individual tracks separately. Compared to high-end sequencers, Deluxe Recorder provides fewer options for large-scale modifications of data from MIDI controllers, such as pitch bend or key velocity. You can record pressure data from individual keys (polyphonic aftertouch), but you can't edit that type of data or add it from scratch. Deluxe Recorder does not allow you to record synthesizer-specific sound data or other system-exclusive messages, and it also lacks the sophisticated synchronization options needed in a professional recording studio or for film and video scoring.

Putting aside comparisons with other sequencers, Deluxe Recorder stumbles occasionally on its own turf. One problem is general torpor. New windows, even simple lists of names, open more slowly than in most Mac software. Expecting an immediate response, you may click again during the two- or three-second delay, with the result that the window flickers on and off as the program struggles to catch up with your clicks. Screen refresh is likewise on the slow side. Fortunately, however, you won't hear delays in the music itself

(continues)

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Another sore spot is Deluxe Recorder's erratic response when settings such as volume or tempo are changed during playback. On several occasions during my tests, changes during playback distracted the program enough that it forgot to shut off some notes that were playing, and on they droned until I turned off the power to the synthesizer. (Since stuck notes are par for the MIDI course even without this obvious Deluxe Recorder gaffe, the program should have a panic button: Turn All Notes Off Now! Three times the entire program locked up, forcing me to restart my Mac. Until this bug is fixed, you should save your work before each playback.

Given these shortcomings, I can't recommend Deluxe Recorder with as much enthusiasm as its smart design and strong editing features would warrant. Nevertheless, Deluxe Recorder is still a very good sequencer and certainly the most capable in its price class.—**Steve Cummings**

See Where to Buy or circle 714 on reader service card.

Remote Access to a Mac

TIMBUKTU/REMOTE 1.0.1

Pros: Easy to learn and use; good remote functionality. **Cons:** Difficult to set up connections with some modems; limited by telecommunications speeds. **Company:** Farallon Computing. **Requires:** Mac Plus; modem (2400-baud modem recommended). **List price:** $295.

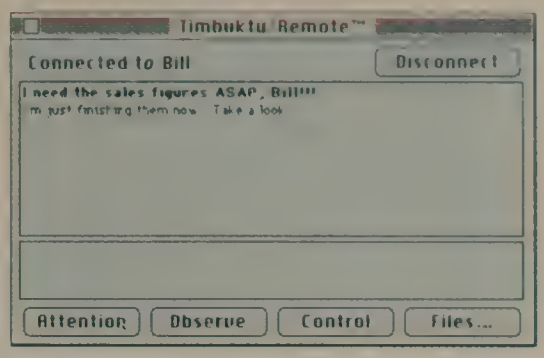
Helping a Macintosh user with hands-on problems or mysterious difficulties is next to impossible unless you are standing right there or have a way to take over the user's keyboard and show him or her how to run the machine. Farallon Computing's Timbuktu/Remote lets you control or observe another Mac from your desktop and send text messages or transfer files between any two users who are running Timbuktu/Remote and are connected via modem. Timbuktu/Remote 1.0.1 also supports all the features found in Network Timbuktu.

Getting a modem to run with Timbuktu/Remote can present some difficulties. When I ran into some problems with the DIP switch settings, even though I could see the blinking status lights on my modem indicating normal operation all Timbuktu/Remote would tell me was, "Your modem is not responding. Try turning it off and then back on again." Because I was dealing with both Farallon and the modem's manufacturer, U.S. Robotics, it took several phone calls to ascertain the problem. As it turned out, the name printed on my modem's case was incorrect. This, of course, meant that the DIP switch settings recommended by Farallon weren't the right ones. Once this minor problem was resolved, the modem worked just fine.

The Connected Window controls the program's activities (see "The Connected Window.") Clicking on Attention lets the remote user join into Timbuktu/Remote's activities, clicking on Observe displays all activity occurring on the remote desktop, Control lets you control the remote Mac with your mouse and keyboard, and Files permits bidirectional transfer of files or blocks of files.

Timbuktu/Remote does not allow direct control over a modem except as part of a dial string. Initialization data from the Hayes modem command set is supplied as a part of the communications setup, but no means of modem control is available. If an error occurs, the current dial string must be aborted, a new one typed in, and the service redialed. This gripe is fairly minor, but it made the setup process trying. On the plus side, Farallon has done an excellent job of explaining how to work with mixed tone-and-pulse dialing as well as PBX systems.

MARK JOHANN



The Connected Window

The Connected Window also includes the chat window, where users can send and receive messages. The buttons at the bottom of the Connected window control the program's activity.

Operating Metaphors

In essence, Timbuktu/Remote (and its network-only sibling) is a simple program. Once two Macintoshes are connected, the user on the dialing end of the link can observe what's happening on the other end or can assume control of the remote machine. Even using a 9600-baud modem, however, Macintosh operations happen much more slowly; mouse movements tend to be somewhat jerky, and the lag between a local mouse click and the remote response is sometimes disconcerting.

Timbuktu/Remote supports DAs and remote-system setup maneuvers (like using the Chooser or Control Panel to change resource selections), as well as access to remote printers and other networked devices. The chat feature, which allows users on both ends of the connection to exchange text messages, is useful and easy to master. Also, the file-transfer feature adds the ability to move files in either direction by remote control.

Farallon Computing's Timbuktu/Remote is a valuable and useful piece of software for managing communications between remote Mac users and for providing remote troubleshooting and hands-on teaching capabilities. The program is guaranteed to make troubleshooting over the phone easier. The $295 price makes Timbuktu/Remote somewhat expensive, but it's a well-constructed, well-documented program that is easy to use. It's clearly the program of choice for anyone who needs to be able to observe what's happening on or operate the desktop of a remote Macintosh.—**Ed Tittel**

See Where to Buy or circle 807 on reader service card.

HyperTalk Programming Tools

COMPILEIT 1.2

Pros: Speeds up execution of time-sensitive parts of scripts; supports the ROM calls in *Inside Macintosh,* volumes I–IV, and in-line machine-language code. **Cons:** Not a general-purpose HyperTalk compiler; slow to compile on low-end Macs; supports only integer math; cannot refer to data on cards other than the current one. **Company:** Heizer Software. **Requires:** Mac Plus; 2MB RAM; HyperCard 1.1 or later version. **List price:** $99; includes HyperCard 1.2.2 and ResCopy XCMD.

DIALOGER 1.0

Pros: Easy to use; enables you to design attractive, complex dialog boxes without using ResEdit; includes several useful XFCNs and XCMDs, including ResCopy XCMD. **Cons:** None. **Company:** theResult Software. **Requires:** Mac Plus. **List price:** $94.29; includes HyperCard 1.2.2.

SCRIPTEDIT 1.1

Pros: Full-featured search and replace; cutting, copying, and pasting between multiple open scripts; many HyperCard functions remain active while editing. **Cons:** None. **Company:** Somak Software. **Requires:** Mac Plus; System 6.0.2. **List price:** $79; includes HyperCard 1.2.2.

WILD THINGS 1.0

Pros: Working examples included for many popular language implementations. **Cons:** Relatively high price. **Company:** Language Systems Corporation. **Requires:** Mac Plus. **List price:** $150; includes Hyper-Card 1.2.2 and ResCopy XCMD.

Normally, creating dialog boxes requires a familiarity with ResEdit or a similar utility. And since HyperCard doesn't support user-designed dialog boxes, you'd need to write an XFCN to call them from within HyperCard. Dialoger, a combination of four stacks and several XCMDs and XFCNs, is an all-in-one package that allows you to design, modify, and call dialog boxes from your stacks.

Dialoger makes it easy. Working from the main stack, you can quickly add text items (static or editable), buttons (radio, push, or check boxes), graphics (icons or pictures), pop-up menus, and lists (see "Dialog Maker"). Once you've selected a new item, you just drag it into place. Dialog Maker has several functions to help you position items, including restricting movement to an invisible grid, nudging an item with the cursor keys, and entering the coordinates for an item's location. The dialog box itself can be any of four types: standard, titled, shadow, or plain.

Once you've designed the dialog box and wish to test it, the Create button builds the working dialog box, and the Show button lets you see how it will look and work. Finally, the Export button lets you attach the dialog box to any stack. Since dialog boxes are saved as separate cards in the Dialog Maker stack, you can go back and change them whenever you wish.

The Dialoger XFCN automatically handles the details of displaying and returning dialog results. All you have to do is supply a simple HyperTalk statement such as:

```
put Dialoger (DataEntry) into dResult.
```

This statement will cause Dialoger to display a dialog box called DataEntry and, when you choose OK or Cancel, it will put the results into a container called dResult. Each dialog item will produce one line of text (indicating its contents) in dResult.

Dialoger also includes external commands and functions (XCMDs and XFCNs) for displaying alert boxes, handling lists, and prompting for answers to two questions at once. As a bonus, as long as you avoid item types that are unique to Dialoger (userText, pop-up menus, and lists), dialog boxes created with Dialoger can be used in applications other than HyperCard.

Dialoger cannot be distributed without a license from theResult Software. Dialoger 1.01 includes SuperCard compatibility; Dialoger Developer, a higher-end version, includes 40 additional XCMDs and XFCNs and an unlimited license to include Dialoger in commercial or shareware stacks.

ScriptEdit

If you do a lot of scripting and want to move beyond the limitations of HyperCard's built-in editor, maybe it's time you graduated to ScriptEdit, a HyperTalk script editor DA.

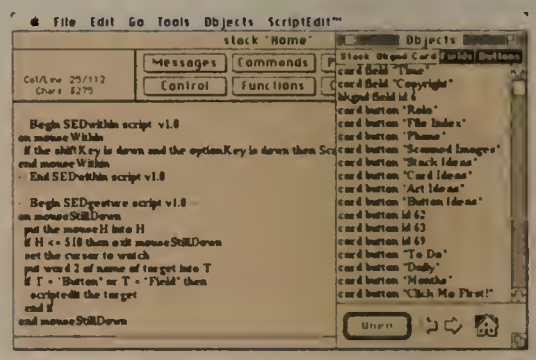
ScriptEdit's Installer stack is used to install the XCMD that provides HyperCard-to-ScriptEdit communication. The XCMD allows ScriptEdit to be popped up by typing ScriptEdit in the message box. In addition, several scripts can be installed in the Home stack that make it even easier to invoke ScriptEdit—by typing SED in the message box, by holding down Shift and Option while the cursor is within a field or button, or by holding down the mouse button over a field or button and dragging the cursor off screen.

Unlike the HyperCard editor, ScriptEdit lets you have as many script windows open at a time as memory permits, enabling you to easily cut and paste between scripts. And unlike HyperCard's editor, ScriptEdit lets you have many HyperCard functions and menus still active while you edit.

(continues)

Dialog Maker

You design and modify Dialog boxes in the Dialog Maker stack. The icons on the right let you select components, make a working copy of the dialog box, and export it to any stack you wish.



ScriptEdit

ScriptEdit enables you to display scripts in any installed font (Times Bold, in this case). You can use pull-down menus (Messages, Control, and so on) to quickly insert any HyperTalk keyword at the current cursor position. The Objects window on the right provides a selective list of objects within the current stack, background, or card. This example limits the list to fields and buttons.

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Circle 73 on reader service card

ScriptEdit also features a powerful search-and-replace function similar to that found in word processors. You can specify the direction of each search; whether or not to ignore case; whether to accept partial words or whole words only; whether to automatically return to the top of the script if you started a search in the middle; and whether to search the current window, all open script windows, or all scripts in the Objects window.

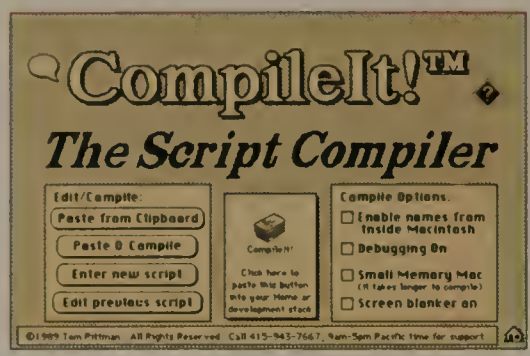
Other useful options include Comment and Uncomment commands, which insert or remove the double hyphen symbols that HyperCard uses to mark comments; Shift left and Shift right commands to move selected text left or right one tab stop; a separate Undo command for each open window; and a Revert command to restore the script version that was last saved. ScriptEdit's Object window boldfaces objects that contain scripts, making it easy to select only objects with scripts for editing. A Compare command compares the two topmost script windows and moves the pointer to the first place in each script where they differ. Windows can be zoomed, arranged, or tiled from pull-down menus. A Preferences dialog box lets ScriptEdit retain the most frequently used options as defaults for future editing sessions.

The only feature missing from my wish list is a syntax checker, but perhaps this is too much to ask from a DA. If you do more than a little scripting, pick up a copy of ScriptEdit. The amount of time you'll save by cutting and pasting between scripts and using the search-and-replace feature should quickly justify the price.

CompileIt

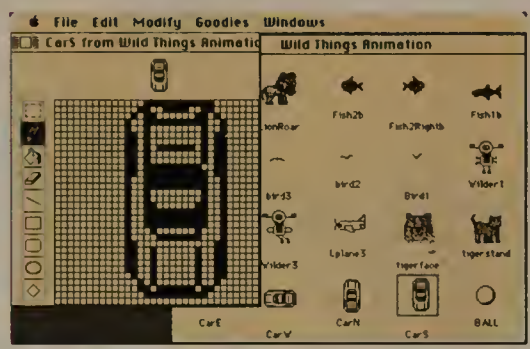
CompileIt is a HyperCard stack that enables you to create compiled XCMDs and XFCNs from HyperTalk scripts. However, it is not a stack compiler, nor can you compile just any script—only some HyperTalk keywords are supported. Eligible scripts must either begin with the keyword Function (for an XFCN) or On (for an XCMD). Once compiled, the handler that follows Function or On becomes the name of the XFCN or XCMD.

Compiling requires several passes through the data. After the global variables are initialized, the first full pass checks syntax and tries to determine variable types. In the second pass, CompileIt converts the script to binary code. Finally, CompileIt adds necessary library routines to the code, links handlers and library routines to the commands where they are called, and converts the resulting code to a resource and adds it to the target stack. The compilation process moves slowly on low-end machines. On my 2.5MB Mac Plus, for instance, a 13-line test script to calculate square roots took 17 minutes to compile. However, if you have correctly identified a time-sensitive portion of your script, the wait may well be worth it. Compiled versions of scripts can run a lot faster.



CompileIt Menu

You set most CompileIt options in this opening screen. Once a script has been entered or pasted from the Clipboard, the two-pass compilation process begins.



WildIcon Editor

WildIcons is a simple but effective icon editor. After creating an icon, you can convert it into a Rez (MPW) or RMaker-formatted file, if you like.

Working with CompileIt involves some adjustments to your usual HyperTalk programming routine. First, you must be mindful of CompileIt's limitations—what can and cannot be compiled, what form the script must be in, and what keywords are legitimate. (A keyword list is available at the press of a button within the CompileIt stack.) Second, existing scripts are harder to compile than those written with CompileIt in mind. Finally, additional speed improvements over your initial compilations depend a lot on how well you can tweak the scripts in order to take advantage of HyperCard and CompileIt eccentricities. And although the CompileIt stack won't run in SuperCard, the XCMDs and XFCNs that it creates can be imported into SuperCard projects.

Wild Things

If you need capabilities that just aren't available in HyperCard, you'll need to acquire XCMDs and XFCNs or learn to write your own. Fledgling programmers typically steer clear of this sort of work. Wild Things may be precisely what they need to get started—40 working external commands and functions, glue routines, and commented source code and templates for MPW C 3.0 and Pascal, LightspeedC 3.0 and Pascal, TML Pascal II, and Language Systems FORTRAN.

Wild Things teaches by example. Sample XCMDs and XFCNs are included within heavily commented stacks, which can be divided roughly into the following types: text manipulation, animation, special effects (drawing), and math (statistics, geometry, trigonometry).

Wild Things also includes a useful utility called WildIcons, an icon creator-editor (see "WildIcon Editor"). Using MacPaint-type tools, you can design professional-looking icons for your stacks or stand-alone applications. Options let you shift, center, invert, fill, flip, or rotate any selected area; draw a mirror image; and work in multiple icon-editing windows. If you don't want to start from scratch, WildIcons will let you open and edit icons found within any Macintosh program.

With a retail price of $150, the usefulness of WildThings' included XCMDs and XFCNs alone probably won't justify buying it. Although 40 externals are provided, they're decidedly special-purpose. But if you're looking for a first-class entry into designing your own external commands and functions, Wild Things is an excellent starting place. Here's where you'll find everything you wanted to know about XFCNs and XCMDs, but didn't have anyone to ask.—**Steven Schwartz**

See Where to Buy or circle 711 (CompileIt), 715 (Dialoger), 794 (ScriptEdit), 811 (Wild Things) on reader service card.

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Puzzle Collection

THE PUZZLE GALLERY: AT THE CARNIVAL 1.0

Pros: Variety of puzzles; excellent sound and color graphics. **Cons:** Some puzzles have obscure solutions. **Company:** Miles Computing; distributed by Electronic Arts. **Requires:** Mac Plus; second disk drive. Hard disk recommended. **List price:** $39.95.

When it appeared a couple of years ago, The Fool's Errand established itself as a new kind of computer game that transcended traditional categories. With its epic plot, its multitude of word and picture puzzles, and its stunning graphics and animation, Cliff Johnson's game captured the attention of Macintosh gamesters and nonplayers alike.

The recently released Puzzle Gallery: At the Carnival is the second game from Cliff Johnson. Is it another Fool's Errand? More or less—no, make that more *and* less.

Colossal Coronary
A 3-by-3-letter puzzle from the Gallery. One letter is immovable; the others can be shuffled until every row and column contains a 3-letter word.

The Comet
One of many block puzzles in The Puzzle Gallery. Put the blocks together to form a word; put the words together to form a sentence.

More Than a Fool

Like The Fool's Errand, The Puzzle Gallery is chock-full of maddening and magical puzzles. The puzzle types will be familiar to survivors of The Fool's Errand: trick mazes, graphic jigsaws, building-block puzzles, crosswords, secret codes, three-by-three letter shuffles, word searches, click-the-buttons-in-the-right-order concatenations, and scrambled word jumbles. The easy ones quickly seduce you into trying just one more; the tough ones follow you through your days and nights as you search for solutions. Even if you're not ordinarily attracted to puzzles and games in magazines, there's a good chance you'll be sucked in by the ones in The Puzzle Gallery.

For one thing, even simple crosswords and word searches are embellished with graphics and special effects to reward winners and goad players who haven't yet solved them. The Puzzle Gallery's graphics resemble those of The Fool's Errand, but on a color Mac II, all the monochrome silhouettes burst into blazing color. In addition, The Puzzle Gallery is punctuated with dozens of digitized sound effects and spoken messages to entertain or irritate you, depending on the state of your spirit.

If your tolerance for frustration is low, you'll welcome the hints and helping hands that have been built into some of the puzzles in this collection. When you've found 27 of the 29 female names hidden in the Ladies' Room word search grid, you'll appreciate knowing that the two that remain are hidden in downward diagonals, and you'll treasure the built-in feature that highlights each diagonal as you search. You'll also applaud the go-back-one key that allows you to undo your mouse clicks as you try to build a complete sentence by clicking the buttons in the right order in the concatenation puzzles.

Less Than an Errand

In spite of these embellishments, The Puzzle Gallery lacks some of the magic of its predecessor. If you were taken by The Fool's Errand because of its tarot-inspired medieval tale, you may be disappointed in The Puzzle Gallery. There's no mythical journey here—just a simple carnival theme to tie the puzzles together. Each of the puzzles, from the Parking Lot to the First Aid Station, reveals more about sleazy Hazard Park, often with a kind of repetitive and low-brow humor. (Want to ride the Loop-O-Puke, the Alpine Upchuck, or the Roto Vomit?)

And if you're hoping for a grand animated climax like the one in The Fool's Errand, you're in for another disappointment. The last puzzle, which reveals Hazard Park's future, is anticlimactic at best. If you expected a gala finale, you might ask yourself why you spent all those hours (and, possibly, another dozen dollars on the less-than-crystal-clear hint book) trying to get there.

Puzzling Conclusions

Does this mean that The Puzzle Gallery is a loser? Absolutely not. All kinds of kids and adults (including me) have disappeared for hours into The Puzzle Gallery since it appeared on my hard disk. Every one of them has enjoyed it, although most said they preferred The Fool's Errand. In the end, The Puzzle Gallery's only real problem may be that it has to follow a masterpiece.

—George Beekman

See Where to Buy or circle 789 on reader service card.

Relational Database

DOUBLE HELIX 3.0

Pros: Icon-based data management; flexible structure; superior networking and CL/1 support. **Cons:** Programming icons are often cumbersome for complex procedures. **Company:** Odesta Corporation. **Requires:** Mac Plus; 1MB of RAM; hard disk. **List price:** $595.

Helix, now Double Helix 3.0, is one of the oldest surviving Mac applications. Odesta originally developed a working version on the Lisa and introduced the Mac product in February 1984. Remarkably, despite major upgrades nearly every year, mostly designed to adapt it to the Mac's vastly increased capabilities, the product has changed character very little. The latest version keeps Double Helix competitive with heavyweight contenders FoxBase+/Mac,

(continues)

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Circle 432 on reader service card

Omnis 5, and 4th Dimension while retaining a visual, intuitive interface.

Thinking in Icons

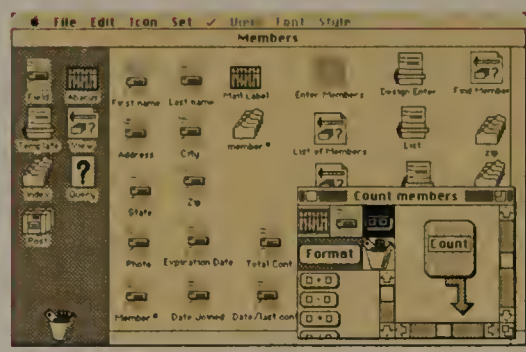
Odesta advertises Double Helix as a database for nonprogrammers, and to a certain extent this is true—at least it gets you to do some programming without necessarily realizing it. To create a Double Helix database (called a Collection in Helixese), you drag a set of field icons corresponding to a single file or table from an icon well into a Relation. You then define a data entry form, design a View or two of the data, pick some Abacus icons to perform database calculations, and index the Relation on the fields of your choice (see "Rounding Up the Data"). You can define many Relations in the same Collection and link them by key fields.

Because the database elements are assembled in this free-form style, a Double Helix database is easy to modify. Most of the aspects of database management that call for procedural programming in other products are handled by responding to dialog boxes or by connecting special icons called Tiles, each of which is actually the equivalent of a programming-language statement. Helix does not allow you to connect a sequence of Tiles that contradicts correct syntax, so beginners and advanced users alike are locked out of possible crashes.

This database style imposes considerable structural overhead on the program, and as a result Double Helix isn't as fast as FoxBase+/Mac, which is primarily a character-based program with a small, compilable procedural language. Double Helix 3.0 takes 2 ½ minutes to build an index for a numeric field in a 1500-record database (310K file size); this is pretty languid but represents a 30 percent improvement over Double Helix II. Once the appropriate fields in a database have been indexed, however, Double Helix is competitive in sorts and searches with other databases. The new version makes suggestions on index creation when you are first setting up a Collection.

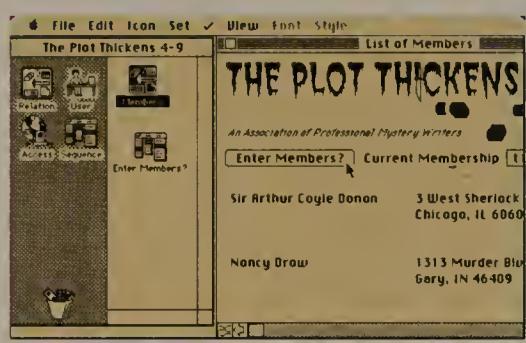
As the Helix Turns

Odesta has added some features in Double Helix 3.0 requested by network users and by developers. The network users claim the improvements are fairly dramatic. First, users can determine which views of the data are updated for a given data change (as opposed to automatically updating all windows on all terminals). Second, user queries on a network are now stacked so that simpler queries are processed first. The combination of these features produces an apparent network response that's from 40 to 100 times as fast as Double Helix II.



Rounding Up the Data

A Helix Relation, corresponding loosely to a table in traditional databases, includes data fields, templates for data entry or reporting, stock queries, and views for screen presentation. This free-form style lends itself readily to database modification.



Pushbutton Programming

New for version 3.0 is the *sequence*, a command file that can be run from a button (see cursor arrow) included in a data view. This feature gives Double Helix the equivalent of macros or program files in other databases.

Another point of interest to network users, particularly users who are interested in connecting to minicomputers or mainframes, is that each Collection can contain a new icon called Access. Odesta has implemented the Helix end of a CL/1 connectivity scheme in which data fields on the remote computer simply appear as standard fields in a Helix Relation—the user doesn't have to worry about communications or details of the host database. The use of this facility, however, currently awaits Apple's implementation of CL/1 on minicomputer and mainframe hosts.

The key new feature for developers is the introduction of sequences (macros, in everyone else's terminology) that can be attached to buttons in different database views (see "Pushbutton Programming"). These sequences can contain any menu commands, selected from a list, and can effectively automate a variety of routine database chores or allow direc-tion of most functions from a single view. This limited concession to the idea of procedural programming doesn't really contradict Helix style, however, because selecting choices from a list still keeps you from getting into serious trouble.

For the rest of us the main attraction of Double Helix 3.0 is the set of Quick Start Packages now included with the database. Covering list management, lead tracking, and time and billing, each is a full-featured application with a guidebook that helps you construct the application step by step (quite a bit of the detailed labor has been done in advance, however). If you work through the guidebooks—each one takes a few hours—you will have not only an understanding of most database features but the ability to customize databases. The Quick Start series is the most serious demonstration to date that Helix really is a fully relational database that nonprogrammers can use. Odesta should have included something like this years ago.

If you have extensive programming experience in Pascal or in dBase, you will probably feel more at ease working with 4th Dimension or FoxBase+/Mac. If you're only keeping simple mailing lists, you would probably be better served by FileMaker. But if you want to have a database that matches the exact needs of your personal work or office, one that you can modify without recourse to professional consultants, Double Helix 3.0 is your best bet. As Apple's connectivity promises materialize, Helix might yet become the easiest way to network to remote databases as well. Although 3.0 is not a quantum leap beyond its predecessor, it's proof that Odesta is determined to grow along with the Macintosh.

—Charles Seiter

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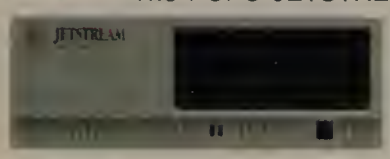

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Mailing List Organizers

DIRECT MAIL 1.0

Pros: Good search and sort capability; good record index. **Cons:** Imported files must be preconfigured; limited ability to customize input template. **Company:** Preferred Publishers. **Requires:** Mac Plus; System 6.0; second disk drive. **List price:** $99.95.

MYMAILLIST 1.1.2

Pros: Imports files easily; prints bar code and logo on envelopes; DA version is convenient. **Cons:** Limited sort function; can't search individual fields. **Company:** MySoftware. **Requires:** Mac 512K. **List price:** Version 1.2.1 $49.95.

Both MyMailList and Direct Mail (which is bundled as an application and a desk accessory) store lists of names and print reports, envelopes, and labels. In addition, Direct Mail lets you create mail merge letters and, through an automatic dialer or a modem, it can dial telephone numbers on your list.

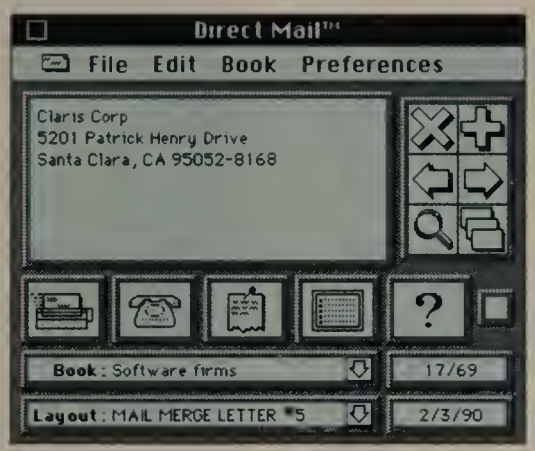
MyMailList has the structured format typically found in standard database-management systems. Direct Mail, on the other hand, is a HyperCard-like, free-form approach to list management. As a result, Direct Mail gives you more freedom in setting up the database, but it's easier to manipulate the data with MyMailList.

Direct Mail files are user defined. You type entries into a blank window, hitting the return key between each line. You can type any number of lines and the order of the fields can vary from record to record. For example, in one record a person's name can be first, in another, a company name can be first. Once you type a record, you can, by clicking buttons, go to two windows: one for telephone numbers, or one that contains a scrollable field for notes.

MyMailList uses an input template. When you start a new MyMailList file, you are given a choice of four sets of 13 labeled fields, or Prompts, such as First Name, Last Name, Company Name. You can change the name of any Prompt, but you can't alter the length of the field. So if you relabel the Last Name field (which only accommodates 13 characters) to Company Name, you might find yourself cramped for typing space. Once you've created your input template, it remains the same for all records in that file.

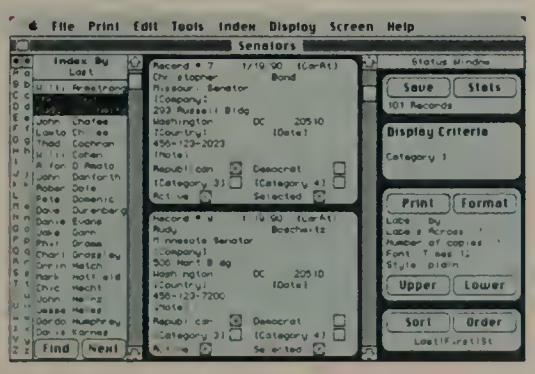
Searching and Sorting

Although setting up MyMailList takes more time and thought than setting up Direct Mail, it pays off by providing more power in searching and sorting entries than Direct Mail. MyMailList allows you to search by field name. With Direct Mail you can search only entire records, so if you are looking for clients who live in Leonia, you will also find clients whose names are Leonia.



Direct Mail's HyperCard Look

Direct Mail's routine functions are controlled using HyperCard-like buttons. The telephone icon takes you to a window containing telephone numbers, which can be dialed automatically. The note paper icon takes you to a Notes window. The abacus icon displays statistics about the current "book," or file, and the magnifying glass and index card icons lead to search and sort.



MyMailList Selection Boxes

The MyMailList input window has four Category check boxes. You can label the boxes, as in the example above, with such names as Republican or Democrat. You can then display, print, or delete only checked records. In this screen, Category 1, labeled Republican, is chosen as the only Display Criteria, therefore, only Republican records will be displayed.

MyMailList lets you sort by any field. Direct Mail only allows sorts by either first or last word in the first or second field, or by zip code.

Once you've entered a search criterion, you can flag the records and print, display, or delete all records that meet that criterion. Both programs take into account multiple criteria through repeated searches. For example, you can flag all California addresses, then run a second search for Massachusetts, thus generating a flagged list for both states. MyMailList also allows you to deflag records meeting a criterion. Using this feature, you can generate a list of all California records but exclude San Francisco records.

If you prefer to thumb through the list rather than search for specific records, MyMailList is easier to use. It displays two records at a time, compared with Direct Mail's one record, and has a standard Mac scroll bar that allows you to move directly to the middle of a list. Direct Mail uses HyperCard-like forward and back arrows.

MyMailList offers a third method of accessing records. It can display an index of records alphabetized by any field. Click on any item in the index and you get the complete record. You can also find items in the index by scrolling or searching through a two-column alphabetic list, which allows you to select, say, the letters MA and get to that section of the alphabetized index.

It is more cumbersome to delete duplicates in MyMailList, but the result is more accurate than in Direct Mail. With Direct Mail, you simply select Delete Duplicates from the Special submenu, and all records that are exact duplicates will be deleted. But variant names such as Larry and Lawrence, misspellings, and even a stray blank space result in records being assumed as unique. MyMailList looks for duplicates only in your sort field or fields. It then flags these Candidates for Purging, allowing you to review the list before you delete.

Importing and Exporting Files

MyMailList imports data from FileMaker, tab-delimited, or comma-delimited files. Direct Mail imports from tab-delimited, DAtabase, or QuickDex files. It is more difficult to import files in

(continues)

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MyMailList. First you have to set up an import list with column names that match the Prompt titles in MyMailList.

You can import files into Direct Mail without preconfiguring. Once you have imported the files, you can arrange all the records at once by forcing or removing a line break between any two fields; if your imported file has first and last name on two separate lines, you can join them. You can also select which fields appear in Direct Mail's three windows: the main window, the telephone window, and the notes window (the same field can appear in more than one window.)

Direct Mail exports in tab-delimited text format or to 12 word processors and databases including 4th Dimension, FullWrite, Word, Works, and Excel. MyMailList exports in tab- or comma-delimited text files or to Word or WriteNow.

Output

Both programs allow you to print a table or any size label or envelope. Direct Mail, however, does a much better job than MyMailList of printing envelopes. With Direct Mail you can import an icon or PICT image, place a message on the envelope, and automatically print a postal bar code for records containing a 9-digit zip code.

One of Direct Mail's strongest features is its mail merge screen. In it, you can type a letter (or import text). At any point you can merge in any line from the main window or the notes window, a phone number, or the current date or time.

The weakest part of both programs is the documentation. MyMailList's manual, which comes in hard copy, lacks an index, however, the company says new documentation should be out by the time you read this. Direct Mail's manual comes on disk but can't be imported to a word processor for searches.

MyMailList has no online help but does have a nonsearchable list of instructions. Direct Mail's help screen allows you to click on buttons to learn their function but does not provide help with the menu commands, which control Direct Mail's more advanced features.

For maintaining structured mailing lists, MyMailList is the better value and the stronger program. However, if you will be importing large unstructured lists, Direct Mail can save you a lot of configuration work. If you need the telephone dialer or mail merge functions, and you don't use MultiFinder, I would recommend Direct Mail's DA version because it makes cutting and pasting addresses from other applications very easy. Otherwise, I'd choose MyMailList.—**Lawrence Stevens**

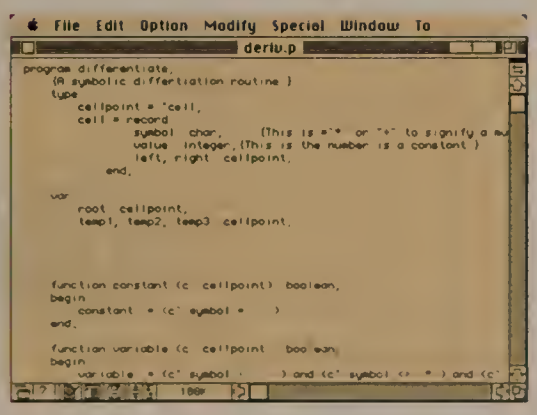
See Where to Buy or circle 716 (Direct Mail), 767 (MyMailList) on reader service card.

Text Editor for Programmers

PREDITOR 1.0

Pros: Multiple buffers; language-specific formatting; bracket balancing. **Cons:** Lacks support for some programming languages. **Company:** Evatac Software. **Requires:** Mac 512K. **List price:** $90.

A simple editor with multiple windows and the ability to support the Macintosh's standard point-and-click interface can be built in about 16K of memory. That is all a programmer needs. Evatac's Preditor is about ten times larger, and it is filled with many of the things that a programmer might want. Preditor's user interface is full of controls, click boxes, tiny icons, and menus, all of which enable you to reformat text and move about quickly and effortlessly within the program you are developing. The macro language for defining controls and functions is a complete programming language unto itself. And everything from the help box to the line counter is well thought through and well executed.



Preditor Controls

Preditor's window with ten additional controls around the border.

Effortless Controls

As in most applications, the features in the editor's main window include scroll bars, a resizing control, a close box, and a zoom box, as well as ten extra controls for more precise movement through text. Each control has its own little icon and performs a frequently desired task. You can, for instance, mark sections of your program for easy return while editing; collapse and expand sections of the text; jump to a specified line in your program; split your editing window into sections as you can in a spreadsheet; control the scrolling speed in both windows; and get information about the document you have open, including what type of document it is, the last time it was modified, and how many lines per page it will take up when printed.

I found surprises and extra features around every corner. Describing all of them would take as much space as the 75-page manual, which is succinct without being incomplete (all of the information is also available online). In general, the manual is easy to use and extensively cross-referenced, but I would have liked a few more examples in the section about macros.

Macro Language

While the features in the editor's main window are mostly for moving around a file easily, the macro language included in Preditor supports all of the constructs of a simple programming language like C. The macro language has global and local variables, For and While loops, If statements, and the ability to call other macros that will return results. Selected text can be passed back and forth as a parameter within macros, and practically every function of Preditor can be called from a macro. One clever macro is called NextMPWError. It opens up an MPW file, finds the error message, and then locates the error in the file and scrolls the file. My only complaints about the macro language are that it is slow and the syntax relies upon cryptic characters like $.

You can tell Preditor to highlight all of the reserved words from either C, Pascal, Modula-2, C++, Basic, Fortran, or Preditor's own macro language while printing. Tags, a special feature that

(continues)

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can be run within MPW or as a separate application, saves all of the names of procedures or functions and the locations of their definitions in a file. Selecting the name of the procedure and starting the Tags command moves the editor to the location of the definition, even if it is in another file.

Preditor's support for different languages is a bit ad hoc, however. The print routine can highlight reserved words, for instance, but the macro language can't access this information. Preditor also lacks an indentation feature to automatically format code, although it would be possible to create one in the macro language.

Overall, however, Preditor is an elegant and very sophisticated editor for the hard-core programmer. **—Peter Wayner**

At press time, Evatac announced an upgrade, Preditor 1.1, which will include user-definable programming-language recognition, printing enhancements, storable formatting codes, and other editing features.

See Where to Buy or circle 787 on reader service card.

3-D Graphing and Presentation Program

VISUAL BUSINESS NO. 5 1.02

Pros: Well-implemented color and 3-D effects; strong output handling. **Cons:** Missing important functions; poorly organized manual; illogical menu commands. **Company:** Visual Business Systems. **Requires:** Mac II; 2MB RAM; 8-bit video card; color monitor; System 6.0.2; hard disk 4MB to 6MB RAM recommended. **List price:** $395.

Although desktop presentation programs provide for the effective use of color, they offer limited graphing capabilities. Visual Business No. 5 attempts to remedy this situation by creating compelling color images directly from your data.

Visual Business No. 5 is an object-oriented QuickDraw graphing program that offers bar, line, pie, area, and scatter charts with full color control. Graphs can be 2-D or 3-D with full object (including text) rotation and

Color Presentation Graph with Shaded Background

Visual Business No. 5 permits some interesting effects for color presentation materials.

perspective support. Backgrounds can be composed of color solids, blends, and spotlighting from a single configurable light source. Visual Business No. 5 includes a separate Output Manager for high-quality color output.

Putting Color in Perspective

Cricket Graph already offers strong graphing capabilities, with some data manipulation and limited color support. Visual Business No. 5 emulates Cricket Graph in operation but offers more striking color and 3-D effects, without any data manipulation. You import data through the Clipboard in Excel or Wingz format, or as a SYLK file. Close the data window and a color graph appears—simple and fast. The graph can be saved in one of the program's spreadsheet formats, or as a PICT file that allows you to export graphs to other programs via the Clipboard. Visual Business does not provide templates, so you must draw each slide from scratch.

The lack of an Undo command is particularly onerous. And I was not impressed by the toolbox. While commands such as Send to Back/Bring to Front exist, commands for grouping and nudging or placing objects are not included. Few keystroke equivalents for menu commands are offered.

The program's manual is most annoying. It offers suggestions, covers all the topics, but does so in an illogical order and without referring to illustrations. Even the installation procedure is poorly explained.

Visual Business allows for the use of the full color palette with 256 colors on screen. Changing colors, however, is confusing. A configurable color palette is provided, but logical color sets like those in PowerPoint are not provided with Visual Business No. 5.

I liked Visual Business's color effects and 3-D manipulations, and I was impressed with the images it produced. Color blends in several directions, spotlighting, object rotation, and perspective control are all well implemented. The program achieves type effects with URW QuickDraw outline fonts. An additional 22-font package is available for $195. The program would be stronger if it worked with the large commercial type libraries, particularly PostScript and QuickDraw.

Spooling Around

An Output Manager is included for several popular color thermal-transfer printers and digital film recorders. Any PICT or PICT2 file can be handled, and all Apple printers as well as some PostScript printers are supported. The Output Manager converts vector objects to raster images, and uses the outline fonts to image text.

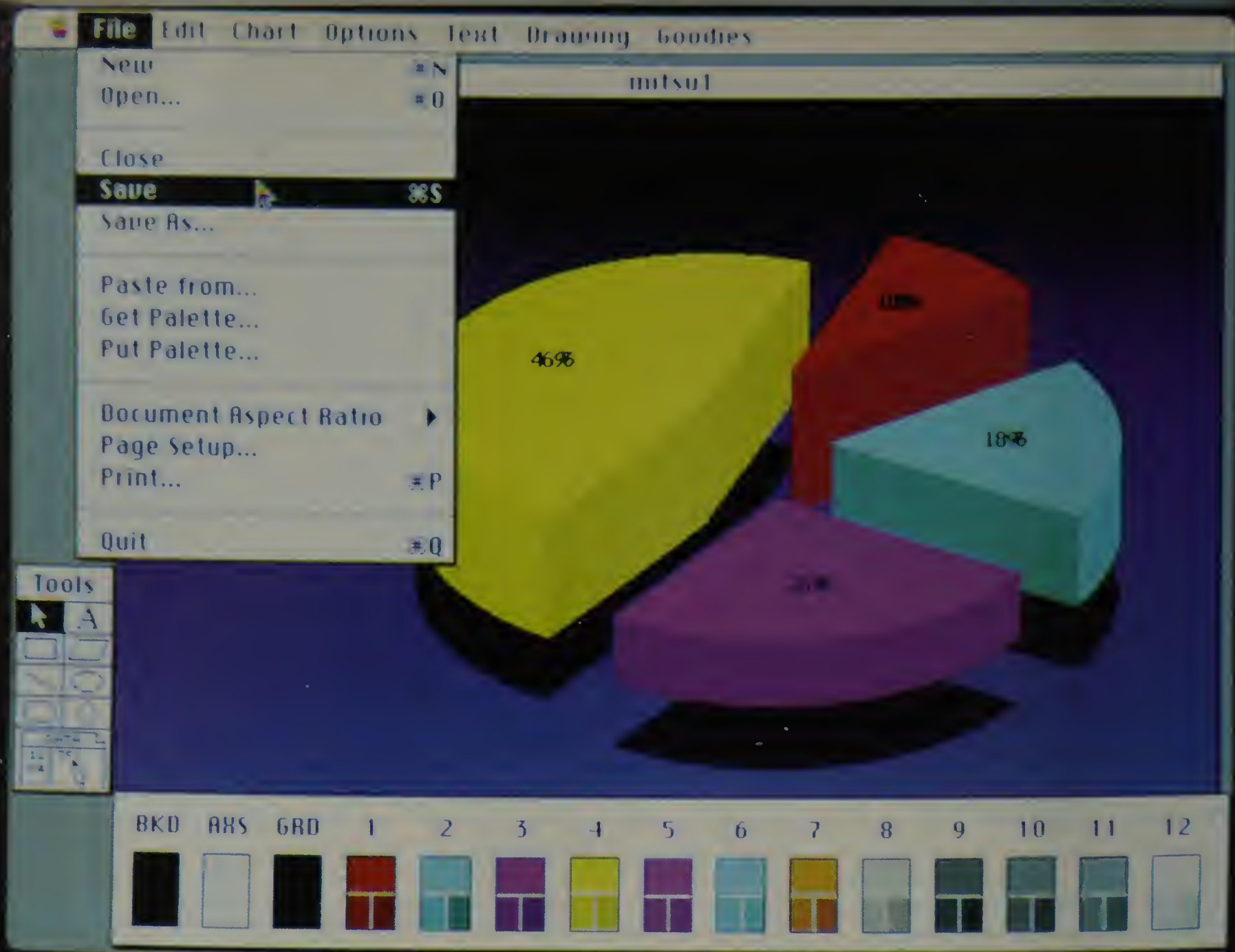
The Output Manager (with its Next-like interface) is essentially a print spooler. Files are written to disk, and spooled to the printer in a configurable print queue. You will need a minimum of 2 megabytes of RAM to operate the Output Manager (4MB to 6MB is recommended), and you will need a hard disk with 6MB of free disk space for spooled files. The Output Manager allows you to create batch jobs for unattended output and solves the problem of driving multiple color devices.

The Output Manager creates slide shows and supports several aspect ratios for the different output formats. However, the more expensive ($795) Professional Output Manager is much faster, supports 32-bit QuickDraw, and comes with all 35 laser fonts.

I cannot recommend Visual Business No. 5 for most Mac users. Your money and time would probably be better spent on the best spreadsheet and presentation programs you can find, or on a less-expensive, more-complete graphing program.

If, however, you create full-color presentation materials often, run a service bureau, or work in a large corporate workgroup, you will find features in this program are worth the money.**—Barrie Sosinsky**

See Where to Buy or circle 810 on reader service card.



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File-Searching Utilities

FINDSWELL 2.01

Pros: Fast searching; remembers recently found files; uses only 39K of disk space; searches Get Info comments. **Cons:** Can't search for files by date or size; few navigation and disk-management features. **Company:** Working Software. **Requires:** Mac Plus. Hard disk recommended. **List price:** $59.95.

SHORTCUT 1.0.1

Pros: Many convenient disk- and folder-navigation features; searches within (and can decompress) StuffIt archives; excellent online help. **Cons:** Slower and needs more disk space than Findswell. **Company:** Aladdin Systems. **Requires:** Mac Plus; System 6.0. **List price:** $79.95.

Admit it, your hard disk isn't organized as efficiently as it could be. You've probably created a filing scheme that takes advantage of the Mac's hierarchical filing system, but you still find yourself shuffling folders more often than you'd like.

The solution? A file-searching utility like Aladdin Software's Shortcut or Working Software's Findswell. Both of these products are startup documents (INITs) that modify the standard Open and Save dialog boxes all Mac programs use. Although Findswell is quite a bit faster, Shortcut does so much more that it's earned a permanent place in my System Folder (see "Searching Comparisons").

Out in the Open

Findswell displays a dialog box that lets you create a new folder or begin searching. Choose the latter option, and another dialog box appears. To locate a file, type a string of text that appears in its name and click on Find.

Findswell also lets you search for text located in Get Info comments. But Findswell's designers didn't take this feature far enough: you can't display the Get Info comments that Findswell locates.

As Findswell locates files, their names appear in a scroll box. To open a file, simply double-click on its name. You can also instruct Findswell to permanently remember the file by clicking on a small icon that appears next to the file's name. Remembered files appear in Findswell's dialog box each time you open it, giving you an easy way to access frequently used files.

Shortcut to Success

Shortcut takes the disk name that normally appears above the Eject button that appears in the Open dialog box and turns it into a menu. Shortcut's file-searching talents go far beyond Findswell's. While Shortcut can't search for Get Info text, it can search for files that were created or modified between certain dates. Better still, it can look for files located in archives within StuffIt.

Shortcut also remembers the files and folders it finds. Shortcut displays the names of remembered files in its Open File submenu, while remembered folders appear in the Go To Folder submenu. The latter submenu provides a wonderfully swift way to move between folders, even ones nested within other folders. It's like being able to leap from one branch to another, instead of having to climb to the bottom of the tree and then back up again to get to a different branch.

Shortcut's menu also boasts a Get Info command that lets you delete and rename files and view their size and creation dates. Advanced users can also use the Get Info dialog box to change a file's type and creator codes. And if you're working with an AppleShare file server, you can use the Get Info command to view and change access privileges for folders.

Shortcut also offers an Erase command, although to access it you have to press the Shift key while opening Shortcut's menu. For extra security, you can use the Secure Erase option, which not only deletes a file, but also replaces its contents with zeros.

Finding the Best Buy

Both Findswell and Shortcut are elegantly designed, easy to use, and replete with keyboard shortcuts. Only Shortcut lets you change its keyboard shortcuts, however. Findswell turned in faster searching times, and that may be important to you if your hard disk stores more than 40MB. Findswell also uses only 39K of disk space, compared with Shortcut's 356K (165K without the online help file), which may be an issue if you use a floppy start-up disk.

But for most people, Shortcut's extra bulk and its slightly higher price aren't significant. Shortcut is more than a file-searching utility; it's a copilot that helps you navigate the channels and eddies of a hard disk.

Finally, remember that disk-management desk accessories, such as CE Software's DiskTop and Electronic Arts' DiskTools Plus, also provide excellent—indeed, superior—file-searching features. However, they do force you to make a trip to the Apple menu. If you want to locate files and manage disks from within the confines of an Open dialog box, Shortcut is the best way to do it. **—Jim Heid**

See Where to Buy or circle 736 (Findswell), 795 (Shortcut) on reader service card.

SEARCHING COMPARISONS

Features	Findswell	Shortcut
Search by name	•	•
Search by date		•
Search in StuffIt archives		•
Search for Get Info comments	•	
Erase files and folders		•
Get Info for files		•
Remember frequently used files and folders	•	•
Unstuff StuffIt archives		•
Change AppleShare access privileges		•
Online help		•
Disk space needed	39K	356K*

** Including ShortCut's help file. Without help file, 165K of disk space needed.*

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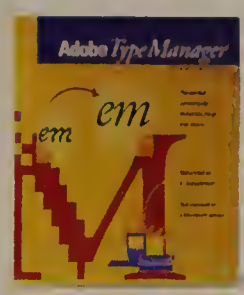

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Circle 18 on reader service

WINDOW SHOPPING

by Lawrence Stevens

This month I look at three teaching aids: one prepares children for reading, another helps high-schoolers learn geography, and a third teaches college students collaborative writing. I also review a guide to proper English.

The Electronic English Handbook 1.02

The Electronic English Handbook ($29.95 from Technology Training Associates) packs into a DA a relatively comprehensive English guide. You can find complete rules, with examples, of punctuation marks, capitalization, use of numbers, and abbreviations. The DA offers sample spelling rules, clarifies some frequently confused words, and specifies bibliographic and parenthetical documentation form.

Most of the sections contain a complete set of rules. There are rules for commas, quotations, capitalization, and bibliographic documentation. The program falls short in only two categories: spelling (7 rules) and frequently misused words (29 words). In both these cases the chances of finding the rule you need are so slim, it's not even worth accessing the DA.

All the information in The Electronic English Handbook is, of course, available in guidebooks, which are much more comprehensive and often less expensive. Because an online guide is more convenient, this DA should have provided a few more features to make it easy to find rules.

You can access each section via one of the 23 buttons along the bottom of the window. Clicking on the button labeled C brings you to the capitalization section; the button with a semicolon (;) on it brings you to the semicolon section, and so on. You can use keyboard shortcuts to move to specific rules in the Word Usage or Common Usage Problems sections. For example, typing Shift-D brings you to misused words beginning with *D*.

However, some of the sections do not have keyboard shortcuts. You must use the scroll bar or the grabber tool to locate specific rules. This can be cumbersome when searching through 9 rules for quotation marks or 28 rules for bibliographic references. The problem is compounded by the fact that when you use the scroll arrows, the screen display is not redrawn until you stop scrolling so you have to work your way through the rules using the grabber tool. But for those of you who don't want to look away from the screen in the midst of a writing project, this is a useful guide.

King Frog

King Frog ($29.95 from Actreo Software), a HyperCard storybook for kids aged 4 to 7, portrays an engrossing story using wonderful graphics and sound along with credible animation. Boys fall off a boat and splash into a lake (see "Trying to Net King Frog"); tugboats move slowly through the harbor tooting as they go. This is the most attractive, pedagogically valuable, and reasonably priced interactive storybook I have seen.

The narration, which is both read aloud and printed on the screen, tells of a frog who is king of a swamp. One day, some young frogs play a trick on him by cutting the stem of the lily pad on which he is sleeping. King Frog continues dozing while he floats out of the pond into a river, which winds through a city, and finally he ends up in the ocean. King Frog likes the wide expanse of sea, and he proclaims to the giant ocean creatures that he will be their new king. But their hilarious laughter infuriates and humiliates him. He then paddles his way back upstream until he returns to his swamp, where he remains happily ever after.

Many of the objects in the drawings are actually buttons, which your child can find through trial and error or by clicking a symbol that highlights the buttons. Some buttons start an animation, others move you to the next frame. Most important, each word of the story is also a button. Clicking on a word causes it to be read aloud.

King Frog offers children a welcome break from having to depend on parents to read stories. Besides, this stack doesn't turn two pages at a time.

(continues)

Trying to Net King Frog

These boys lean over too far while trying to net King Frog. Their canoe wobbles and finally they splash into the river. The words at the bottom are read when the screen first appears. Clicking on any word causes it to be read again.

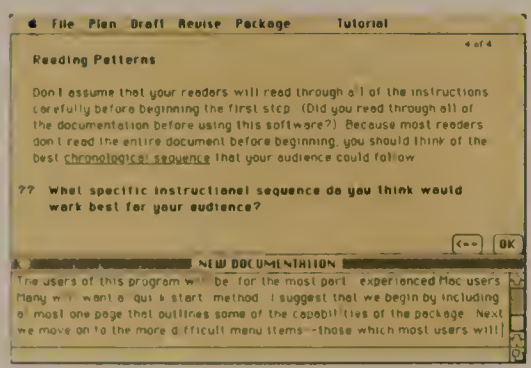
Collaborative Writer 1.0

Collaborative Writer ($249 for a network license from Research Design Associates. $69.95 for single version) is a college-level program intended to teach collaborative writing—the process of creating a memo, instructional manual, proposal, or a report in a group. The program describes four types of collaborative writing. In the first the supervisor assigns the work, the group plans and drafts it, and the supervisor then revises and edits it. In the second, the group plans the document and one person drafts, revises, and edits it. In the third, one person plans and drafts the document and the group revises and edits it. In the last, all the members of the group plan, draft, revise, and edit the document.

The program walks you through the steps. It begins by describing how to determine the general purpose of a project and then asks you to define your purpose. Next it helps you characterize your audience and determine the type of content that would be appropriate. After you read all the information about each step, the program asks a question, such as "Who is your audience?" or suggests an action such as "Brainstorm a possible summary statement."

You answer the question, take notes on the instructions, and build the document in the Notes window, which appears at the bottom of the screen. You can have any number of Notes windows open at a time (see "Collaborative Writer Windows").

The only way to position the Notes window is by using the mouse. However, by selecting Transfer to Word Processor, the Notes Window grows to full screen size and acquires basic word processing capabilities. The Word Processor lets you cut, copy, and paste and choose double- or single-spaced lines, but nothing else.



Collaborative Writer Windows

The upper window provides instructions for a collaborative writing project. Most instructional screens end with a question, which you can answer in the Notes window (bottom).

Collaborative Writer is meant to be used on a network. Group members access the program's instructions and accompanying Notes, make revisions or add comments, and pass the document to the next participant. If you are not on a network, you can pass the documents around on disk.

The program's authors, who are on the faculty of the Department of Rhetoric at the University of Minnesota at Minneapolis, have impeccable credentials in collaborative writing. The on-screen instructional material is clear and concise. But the rest of the program leaves a lot to be desired.

The biggest problem is the lack of all but the most rudimentary text-editing features, but there are other difficulties as well. The Notes and Word Processor windows lack zoom boxes. You can resize them only by using the resize box on the lower right of the window. And because the instructions window, which takes up two-thirds of the screen, cannot be resized, it limits your Mac desktop arrangement. You cannot copy text from the instructions window, so you can't paste information from it in the Notes window.

Because of these shortcomings, it would have been far better to provide the instructions on a DA (or even on hard copy) so students can use their own word processors. While I give this program an A for content, I'm afraid I have to give it a D for form.

State-Smart HyperCard Stack 2.0

State-Smart ($75 from HyPerFormance) is a HyperCard high school–level tutorial on U.S. geography. This stack contains outline maps of each state, contour and topographical maps of U.S. regions, and maps showing state facts.

As with all good HyperCard stacks, the advantage of State-Smart lies not so much in its information—which can be found in any classroom atlas—but in how easy it is to use. You get to the various State-Smart cards by clicking on attractive and pictorially descriptive buttons or by clicking on map locations (see "State-Smart Directory").

For example, to get to a State Facts and Figures section, you select a state's name on the directory card, which is a map of the United States. Each state has a State Facts and Figures card containing a map of the state along with a list of information such as the state bird, flower, population, area, and capital. Four radio buttons let you toggle between viewing the population of major cities in that state, population of counties, zip codes, and area codes. Unfortunately, the zip code list doesn't specify the cities or towns, and the area code list specifies only one town (sometimes small) for the area code.

State-Smart Directory

By clicking on any state in the map on this directory card, you get to its State Facts and Figures card. The buttons along the bottom and side lead you to other screens.

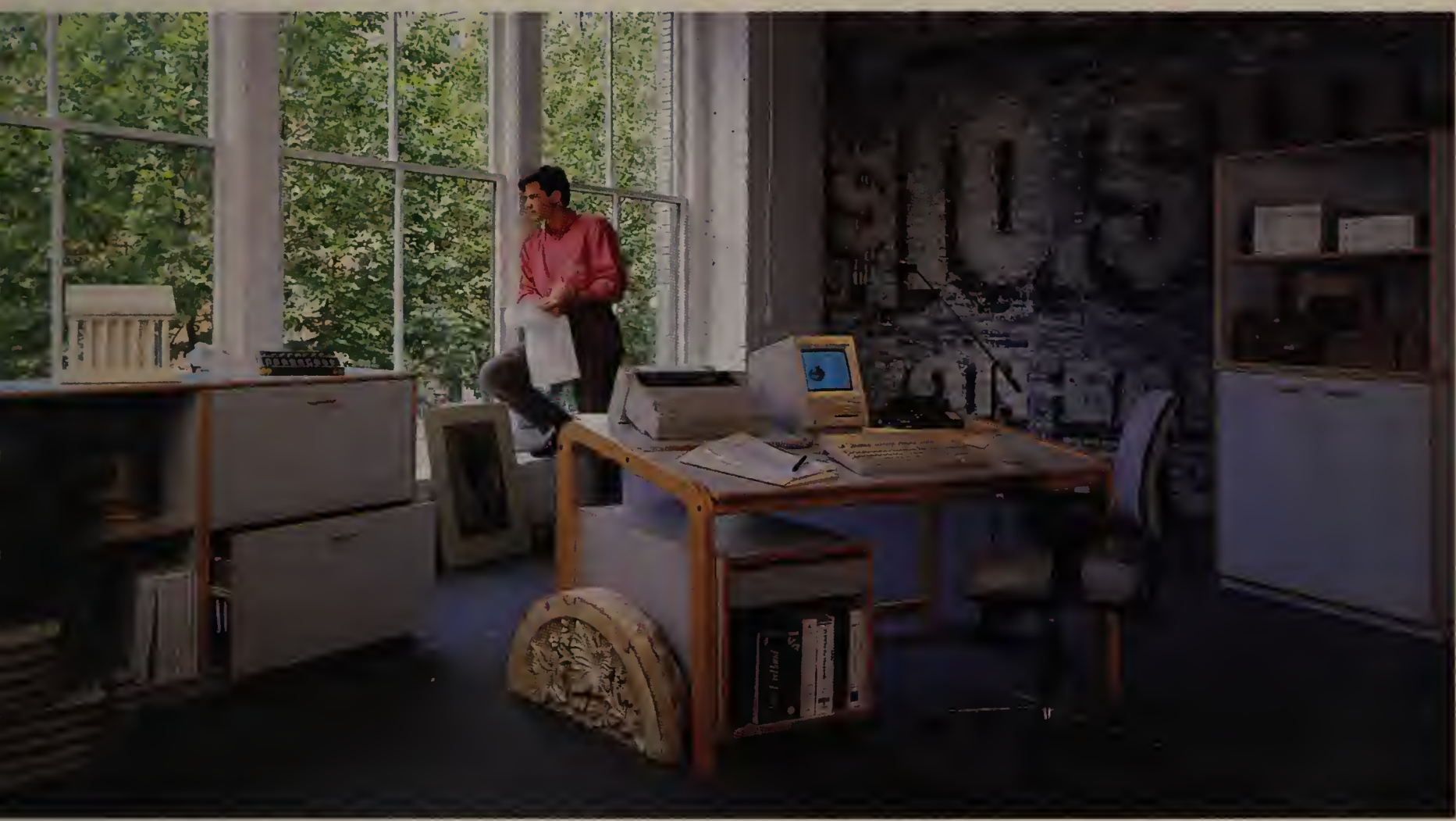
The topography section offers a set of maps that depict waterways, mountain ranges, and major cities. The contour section shows elevation. Selecting a region in the national topography or contour map zooms you to the region card. You can move from region to region by clicking on directional arrows on the compass icon.

State-Smart also has a quiz feature, which displays State Facts and Figures cards with a piece of information, such as the state capital, left blank. The students must select the correct answer from a multiple choice list. The quiz can be set to ask random questions, or to focus on a particular region or particular types of questions such as state population and capitals. State-Smart displays a percentage score after the quiz is completed.

The program makes life easy for student and teacher: the on-screen teacher's guide suggests a number of interesting assignments; and the help screen explains in minutes how to work the program. State-Smart also might motivate students in U.S. geography. ◻

See Where to Buy or circle 708 (Collaborative Writer), 721 (The Electronic English Handbook), 751 (King Frog), 801 (State-Smart) on reader service card.

The table Apple would have designed, had they gone into the furniture business.



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Circle 296 on reader service card

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Introducing DataLink Express, a fully Hayes compatible 2400 baud modem designed for the Mac. With comprehensive status light array, "line engage" indicator and upgradeable design (add send-fax capability and MNP error correction). Comes complete with a matched Mac-platinum case, serial port input, a DB-25 connector and communications software. **Datalink by Applied Engineering ($189.00)**

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There are a lot of hard drives on the market. Each one claiming to be "unequivocally the best." And, most are proud how cheap they are.

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All the hard drive brands sold today have a couple of things in common.

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A Short Economics Lesson

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A Better Way

Here's the trade secret that will allow you to get the drive you want and save money too!

Universal MacProducts, Inc. is the worldwide leader in one thing. Kits. We make more Macintosh hard drive kits than anyone else. There's a StorMate™ kit for internal installations or for external use.

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Since all hard drives, regardless of how you buy them, come from the same source. The only variable is the "box." Here's what comes standard with our StorMate kits. Cables, bracket or enclosure cabinet, StorWare™ software and manuals. And somehting we call **Total Satisfaction**.

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NEW PRODUCTS

Edited by
Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

8-Bit Upgrade Kit

An 8-bit upgrade kit for the 4-bit Apple and Abaton 300/S scanners. Includes 8-bit controller board, scanning software, optional image processing software and on-site installation by an Abaton technician. Basic kit $695; kit with software $795. Abaton, 415/683-2226.

Accupower UPS

Uninterruptible power system for the Mac SE. If system crashes suddenly, the product automatically takes a picture of the file being used, and saves all information such as default values, registers, and calculations to disk and automatically restores the data when the system returns. Keeps computer running for up to ten minutes during a power loss. $348. Emerson Computer Power, 714/545-5581.

AutoBack and AutoBack Server

Automatic disk backup utility maintains an up-to-date shadow of user and file-server disks with no required user intervention or machine downtime. Backs up to any specified folder or disk, local or remote. Works with any Mac-compatible network system. AutoBack $99, AutoBack Server $250. Soft Trends, 714/650-2158.

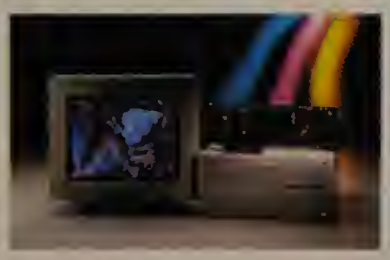
ChromaScript

Raster image processor that lets you create PostScript color slides for use in prepress applications, graphic design, and business presentations. Can communicate via AppleTalk and can interface with workstations through the unit's RS-232C and Centronics parallel ports. $17,900. Agfa Matrix, 914/359-3201.

ChromaScript

ColorCard/24

24-bit color display board for the Mac II series. Has 8-bit color capacity built into the logic board and the 25MHz processor. $999. SuperMac Technology, 408/245-2202.



ColorCard/24

The Cordless Mouse

Cordless mouse input device that uses infrared signal transmission technology. Can operate the Mac up to five feet away from its base receiver. $149.95. Practical Solutions, 602/322-6100.

DayStar Fast Cache IIci

Add-in cache board for the Mac IIci that improves processing speed 40 percent over the standard IIci. Plugs into the IIci's Cache Connector. $995. Daystar Digital, 404/967-2077.

Drive Exerciser for Mac 400K & 800K Drives

Hardware and software combination that enables a technician to align 400K and 800K 3 1/2-inch Mac floppy drives. Lets user control stepping the heads to see azimuth, radial, and track 0 using a 3 1/2-inch Dysan Analog Alignment disk. $269. American Educational Services, 703/256-5315.

The FlexScan 9060S

A 14-inch multiscanning color monitor that supports the entire range of monochrome and color-display standards for IBM PC compatibles and Macintosh II systems. Automatically adjusts for horizontal scan frequencies from 15.5kHz to 38.5kHz and vertical frequencies from 50Hz to 90Hz. $1059. Nanao USA, 213/325-5202.

The FlexScan 9060S

MacDiscus

A 5 1/4-inch rewritable optical disk subsystem that lets users store, retrieve, modify, or delete data on 650MB rewritable optical disks. Enables users to run popular Mac applications directly on rewritable disks. Can be connected to a standalone workstation or to a network file server. $6495. Advanced Graphics Applications, 212/337-4200.

MacRescue

A piggybacked expansion board that snaps onto the enhanced ROM board to upgrade Macintosh 128K or 512K machines to 1MB–4MB of RAM. Includes SCSI port. $317. Computer Care, 612/371-0061, 800/950-2273.

Mobius Mouse

Cordless mouse that uses infrared technology to move the cursor in either Fine Tune or Speed Up modes. Mouse automatically goes into sleep mode after a user-designated period of inactivity to conserve power. $149. Mobius Technologies, 415/654-0556.

(continues)

Percon Series 10

Series 10 bar-code interface device for the Mac that "teaches" itself to read multiple bar codes. Programmed bar-code type remains in memory whether the unit is off or on. Data cables are available to connect the Series 10 to the Apple Desktop Bus. $595. Percon, 503/344-1189.

RasterOps Calibrator Display System

Self-calibrating color display system. System includes a 19-inch color display monitor, an 8-bit or 24-bit display board, an optical sensing device, software, and cables. Complete system $13,645; without board $8650. RasterOps, 408/562-4200.

TravelPac

Portable storage system for data on a hard disk that's compatible with all Mac models. Available in 40MB and 80MB capacities, the drives measure 2 by 4½ by 7¼ inches. TravelPac 40 $1195; TravelPac 80 $1895. Tallgrass Technologies, 913/492-6002.

Viking Trinitron

A 19-inch color-display system for the Mac II that includes the Moniterm 8-bit color controller board. Displays 1024 by 826 pixels. Has a 69Hz refresh rate. $5995. Moniterm, 612/935-4151.

Wiz

Mouselike input device contains three buttons with six settings, four of which are user-definable. Crosshair window facilitates applications requiring precision. Color-coded templates available for 34 major DTP, graphics and office-automation programs. $249. CalComp, 714/821-2000, 800/225-2667.

Wiz

SOFTWARE

Adobe PhotoShop

Image-manipulation program for graphic artists that has full set of image-editing, color-correction, and retouching capabilities. Automatic Trap function lets users print separations directly from PhotoShop or save images as Encapsulated PostScript documents. 1MB min. memory. $895. Adobe, 415/961-4400.

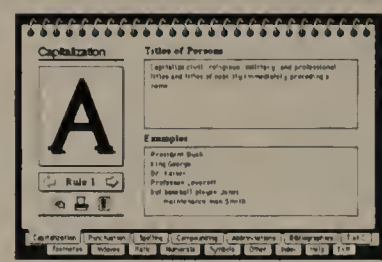
Percon Series 10

Alchemy II

Molecular modeling software for working with 3-D molecular structures. Provides chemically correct tools for building and manipulating molecular structures using menus and the mouse. Runs in color. 2MB min. memory. $950 for businesses; $650 per copy for academic institutions; volume discounts available. Tripos Associates, 314/647-1099.

American English Writing Guide

Writer's reference guide for style and punctuation. Includes tips and guidelines for better writing. Also has rules for difficult, confusing spellings; draws distinctions between words like affect and effect; and assists with spelling foreign words commonly used in English. 1MB min. memory. $49.95. Nova Development, 818/992-3222.



American English Writing Guide

Block Out

3-D brain-teaser in which players try to maneuver and rotate falling blocks into position so they will create complete layers as they fall into a pit. As layers form, they vanish, giving the player more points and more room to work. 512K min. memory. $39.95. California Dreams, 408/435-1445.

Block Out

ClickWriters

HyperCard writing stack that includes a digest of English grammar, style, and punctuation; a tutorial stack; and a database to store letters. Program comes with models for a variety of standard types of letters (for instance letters of recommendation or complaint) that can be customized. 1MB min. memory. $24.95. StackWorks, 217/328-5257.

Compare-A-Loan

Program that enables you to compare several aspects of up to five different types of loans on a single report. Evaluations include elements such as fixed or adjustable interest rates, graduated payments, extra payments, skipped payments, constant principal reduction, odd-day interest, and balloon payments. 512K min. memory. $59.95. Softflair, 414/797-4491.

Enhance

Scientific and medical image-manipulation software. Supports as many as three iterations of the same image on screen at the same time, with synchronized cut and paste operations possible between them. In addition, program offers split screens, gray-scale histograms, line profiles, image overlays, and touch-up tools. 2MB min. memory. $500. MicroFrontier, 515/270-8109.

EZ Vision

MIDI sequencing software for recording, editing, and playing back music with MIDI synthesizers and the Mac. Has Mixer window with faders for setting volume and stereo balance, Arrangement window for chaining sections of songs together, MIDI file compatibility, and MIDI clock synchronization. Designed for multimedia users and MIDI novices. 1MB min. memory. $149.95. Opcode Systems, 415/321-8977.

FountainView

Clip art collection of fountains created as a series of halftone dots. Each fountain is composed of eight halftone shapes in various dot sizes. Collection is composed of 64 files in EPS format. 1MB min. memory. $40. ISIS Imaging Corporation, 604/873-8878.

(continues)

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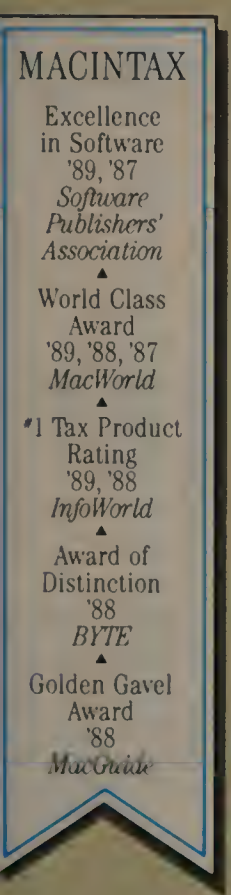

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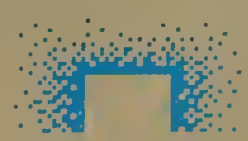

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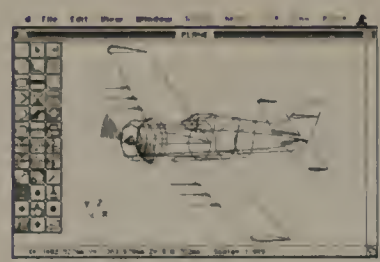
Program for creating Gantt charts with on-screen graphics editing. Reads MacProject and MacProject II files directly; provides split window controls for viewing different parts of a schedule, and supports a diverse set of symbols for task bars, date arrows, milestones, and interfaces, and lets you create custom symbols. 1MB min. memory. $195. Varcon Systems, 619/563-6700.

HandOff
Utility that lets users open all documents from the Finder. Can substitute comparable applications for ones the user does not have installed so documents can be opened when the initial application is not available. 512KE min. memory. $49.94. Software Innovations, 214/727-2329.

MacConcept
CAD software that lets users create 3-D designs with the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ability to rotate dynamically, modify, and cut sections from an image during the design process. Creates real-time dynamic animation; views other 3-D data using IGES, DXF, Ford Standard Tape, GM, and other translators combined with the Mac. 1MB min. memory. $1998; $1495 for Claris CAD owners. Klex Software, 313/477-6800.

MacLotto
Interactive lottery wagering system that can be applied to any lottery configuration. Contains a proprietary array of infrequently selected numbers and generates an Odds Improvement Multiplication system on a lottery-by-lottery basis. 1MB min. memory. $99. U.S. Mathematical Laboratories, 508/653-9193.

MacTunes
Music program that lets the user record and play back songs on the Mac. The user may enter a song from a piece of sheet music without knowing how to read music, then play back the song using sounds from any of 13 instruments. Includes 100 songs. Songs can also be stored for later playback. 1MB min. memory. $49.95. Pentallect, 602/951-3812.

Manhunter: New York
Game that places the player in the Big Apple two years after an alien invasion and subsequent world takeover. Your role is that of a manhunter, whose goal is to track and monitor subversive activities. You choose to play a deadly arcade game in a Flatbush bar, visit a spooky Coney Island carnival, or fight off a band of street thugs. 1MB min. memory. $49.95. Sierra On-Line, 209/683-4468.

Manhunter: New York

MasterForms
Collection of more than 90 common business forms to be used with Adobe Systems' TrueForm form processing program. Questions on forms are set in Times typeface, and answers are filled out in Courier for printing on PostScript and LaserWriter printers. 512K min. memory. $79. JLA Computer Services, 215/855-5159.

Message Center
HyperCard stack for telephone message tracking. Includes an Archive Stack where all messages can be stored for later retrieval. Stacks, files, or applications can be linked in the program. Message Center button may be placed into other stacks. 1MB min. memory. $49.95. HyperMedia Publishing Group, 617/246-1234.

Metamorphosis
Software that converts PostScript fonts into editable outline formats. Compatible with any PostScript printer. 2MB min. memory. $295. Altsys, 214/424-4888.

ModelShop
Three-dimensional architectural modeling application that performs surface modeling and can generate any user-defined perspective. 1MB min. memory. $595. Paracomp, 415/543-3848.

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Moriarty's Revenge
Detective game in which player must track a suspect around the world and identify the suspect's gang affiliation to solve a case. Cases increase in difficulty as you rise in rank from Claims Adjuster to Master Sleuth. 512KE min. memory. $59.95. HJC Software, 919/490-1277.

Moriarty's Revenge

Mystery Fossil
HyperCard-based homework-exercise program in physical anthropology for first-year college students. Introduces a mystery fossil through pictures and information about the piece. Students consult a database of pictures and text about known fossils in order to identify the fossil. 1MB min. memory. Single copy $29.95; volume discounts available. Research Foundation of SUNY, 315/267-2053.

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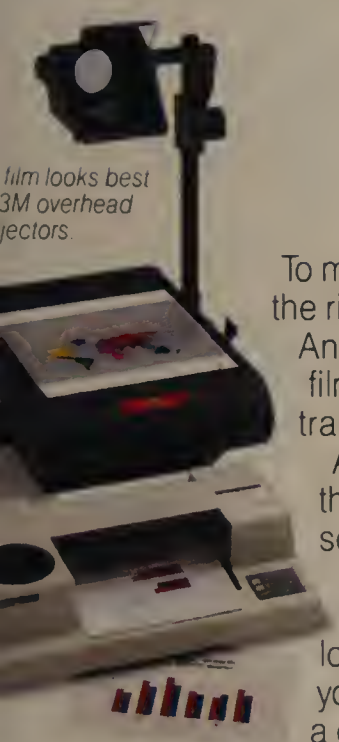
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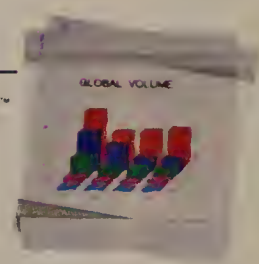

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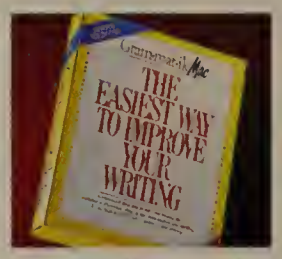

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Jam Software - Smart Alarms
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Insight Expert Accounting
Accounts Payable ... 395.
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ImageStudio, LetraStudio, ReadySetGo! ... ea 274

Lexpertise U.S.A. Inc.
Mac Proof ... 114.

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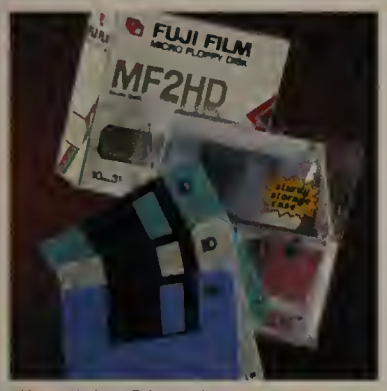

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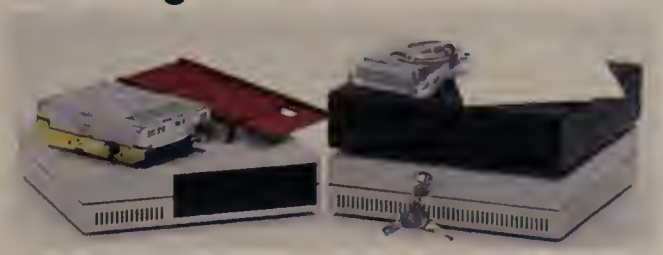

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for Syquest Drives ..... 178.
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for 5.25" Drives ..... 69.

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CDC 135 Mb ..... 1795.
CDC 172 Mb ..... 1995.

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Connor 100 Mb ..... 788.

Quantum
Quantum 40 Mb ..... 410.
Quantum 80 Mb ..... 648.
Quantum 105 Mb ..... 788.

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Seagate 30 Mb ..... 355.
Seagate 45 Mb ..... 398.
Seagate 60 Mb ..... 530.
Seagate 80 Mb ..... 598.

5.25" Half Height Drives

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CDC 170 Mb ..... 1595.

Micropolis
Micropolis 150 Mb ..... 1148.
Micropolis 330 Mb ..... 1895.

MiniScribe
MiniScribe 150 Mb ..... 1128.

Seagate
Seagate 60 Mb ..... 460.
Seagate 80 Mb ..... 495.

Syquest
SyQuest 44 Mb Drive ..... 625.
(comes with 1 cartridge)
44 Mb Cartridges ..... 89.

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CDC
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CDC 300 Mb(16ms avg access) 1845.
CDC 300 Mb H(10ms avg access) 2198.
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MultiClip ..... 49.
Plus ..... 94.
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Read-It! Personal ..... 98.

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Alphabits ..... 68.
Grappler Spooler ..... 49.

Paracomp
Milo ..... 158.
Model Shop ..... 378.
Swivel 3D 294

Paragon Courseware
Nisus ..... 225.
QUED-M ..... 98.

Personal Bibliographic
ProCite ..... 198.

PLI Software
Turbo Back 49
Turbo Cache or Spool ..... ea.59.
Turbo Optimizer ..... 25.
Turbo Bundle ..... 120.

Power Up!
Fast Forms ..... 89.
Address Book ..... 58.
...w/Leather Notebook ..... 83.

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Vantage ..... 51.

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Expressionist 2.03 ..... 78.
Theonist ..... 229.

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Wall Street Investor ..... 395.

Prometheus
MacKnowledge ..... 130.

ProVUE
Panorama 1.5 199

Quark
QuarkExtras ..... 55.
QuarkStyle 169
XPress ..... 455.

Sabastian Software
Image Grabber 2.0 ..... 31.

Satori
Bulk Mailer ..... 77.

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Software Ventures
Microphone 1.5 ..... 109.
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backFax 124
Curator ..... 72.
SmartScrap & Clipper ..... 45.
Super Glue II ..... 61.

Somak
Script Edit ..... 49.

Lightning Scan ..... $368.

Thunderware
Very affordable high resolution 400 DPI hand held scanner. Saves images in TIFF, EPSF, Paint, PICT, Scan or Grayscale formats.

SuperMac Software
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Network Disk Fit ..... 225.
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PixelPaint Pro ..... 389.
Sentinel 2.0 ..... 88.
SuperSpool ..... 58.
SuperLaserSpool
Multi User (1 to 5) ..... 289.
Single User ..... 85.

Survivor Software
Invoice It ..... 49.
MacMoney ..... 59.

Symantec
Just Enough Pascal ..... 49.
Lightspeed Pascal 2.0 ..... 92.
More II ..... 249.
S.A.M. ..... 65.
S.U.M. II ..... 94.
Think C 4.0 ..... 165.

Symmetry
Acta Advantage ..... 64.
HyperDA 1.2 ..... 46.
Key Plan ..... 245.
Picture Base & Retriever ..... 54.

Synergy Software
KaleidaGraph 2.0 ..... 145.
Versa Term 4.0 ..... 88.
Versa Term Pro 3.0 ..... 174.

Synex
MacEnvelope Plus ..... 179.

T/Maker
WriteNow 2.0 ..... 108.

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ArtClip 2nd Ed ..... 65.
ArtFonts 1/2/3 ..... 48.
ArtFonts Pak ..... 129.
FontShare ..... 129.
Icon-It ..... 42.
Sound Clips 1 or 2 ..... ea. 48.

TGS Systems
ProGraph ..... 126.

Timeslips Corporation
Timeslips III ..... 168.

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Timeworks
HyperWorks Organizer ..... 57.
Publish It! 225

TML Systems
TML Pascal II 3.0 ..... 56.
...w/MPW 3.0 108
Source Code Library 39

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TOPS (Dos) 3.0 ..... CALL
TOPS (Mac) 3.0 ..... CALL
TOPS NetPrint ..... CALL

Totem Graphics
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Birds, Domestic Animals, Fish, Flowers, Food, Holidays, Insects, Nautical, Sports, Tools & Hrdwre, Wild Animals, Women ... ea. 98
EPS Color Clip Art by Volume:
Volume 1 - 12 ..... ea. 74.

Traveling Software
Lap-Link Mac III ..... CALL

Trendware
XCAL ..... 77.

True Basic
True Basic 2.02 ..... 55.
Graphics Toolkits - 3-D, Business or Scientific ..... ea. 43.

U.S. Micro Labs
FontSizer ..... 69.

VersaCAD
VersaCAD Drafter ..... 419.

Visionary Software
Synchronicity ..... 38.

WordPerfect Corp.
WordPerfect 1.02 ..... 179.

Working Software
QuickLetter ..... 73.

Xerox (Datacopy)
AccuText ..... 545.

Zedcor Inc
DeskPaint/DeskDraw ..... 64.
ZBasic 5.0 ..... 89.

Mac 286 ..... $1,099.

Orange Micro
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HARDWARE

Scanners

Abaton Scanners
300/GS (8 Bit) ..... 1,495.
300/S (4 Bit) ..... 1,198.

Logitech
Scan Man ..... 320.

RasterOps
TrueCapture 324 ..... 1,995.
...w/ColorBoard 264 ..... 2,395.
w/Comp. Video Option ... 2,398

Sharp Color Scanners
JX 300 ..... 3,995.
JX 450 ..... 5,995.

Thunderware
Lightning Scan ..... 368.
ThunderScan 5.0 ..... 179.

Xerox - Datacopy Scanner
Datacopy 730GS ..... 798.

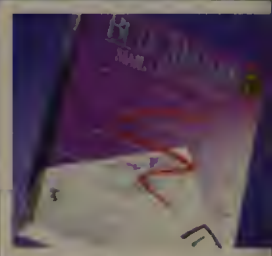
Modems

Everex
EMAC Md2400 MNP 5 198

Hayes
Smartmodem 2400 38
Smartmodem 9600 79

MacTech - SmartLink Modem
2400m (MNP 5) 24
2400s 1

Shiva Corporation
NetModem V2400 43



Bulk Mailer ..... $77.

Satori Software
Powerful mail list management program. Features include duplication elimination, Zip code & alphabetical sorts, Zip +4, etc.

Supra Corp.
Supra Modem 2400 11

Telebit
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T-2000 (19,000 BPS) 1,25
T-2500 V.32 (19,000) 1,25

U.S. Robotics
2400 Baud 32
9600 HST Baud 68

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Xceed (8 Bit - 13") 38
Xceed (8 Bit - 19") 59

NEC Color Monitors
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NEC Multisync XI 20" 2,69

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Trinitron 19" Monitor 3,39
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264 (II series - 13") 78
264 (SE/30 - 13") 1,03

Sony - Color Multiscan
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16" HG Color 2,49
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548s (548e w/SCSI) 47
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LapLink Mac III Connectivity Pac ... $81.

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QuickMail 2.2 ..... CALL

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Emerald City Software
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Smart Art I, II, or III ..... ea. $84.

Orchid Technology
Mac Sprint II 249

Total Systems
Gemini 020/030 Accelerators
68020 SE - 16MHz 697
68020 SE - 25MHz 1,118
68030 SE - 16MHz ..... 976.
68030 SE - 20MHz 1,118
68030 SE - 25MHz 1,285
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Impact 40 Plus ..... 735.
Impact 80 ..... 1,095.

PLI (Peripheral Land, Inc.)
Infinity 40 Turbo ..... 1,098.
Infinity 40/40 Turbo ..... 1,798.
Infinity Optical Disk Drive
600 Mb ..... 3,998.
TurboFloppy 1.4 ..... 345.

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Cayman Systems
Gator Box ..... 2,159.
Gator Mail Gateway ..... 698.
Gator Mail to Unix ..... 698.
Gator Share Software ..... 1,398.
Gator Card (Mac SE, II, IIx, IIcx, IIci, or SE/30) ..... ea. 460.

David Systems
Twisted Pair Ethernet
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FastNet SE or SE/30 ..... 365.
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Accelerator SE ..... 895.
SCSI CheaperNet ..... 748.
SCSI Thickwire Ethernet ..... 849.

Farallon - PhoneNet
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DIN-8 (10 Pack) 198
Star Connector 19
Star Connector (10 Pack) 198
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Star Controller EN ..... CALL
Repeater 315

Kinetics
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EtherPort Lattis Net 498
Fast Path 1,945

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ZoneNet - DB-9 or DIN-8 ..... 17.

Nuvotech
NuvoLink SC 345
Turbo Bridge 318
Turbo Net - DB-9 22
Turbo Net - DIN-8 21
Turbo Net ST - DB-9 30
Turbo Net ST - DIN-8 30

Shiva Corporation
EtherGate 1,831
InterBridge ..... 648.
NetBridge ..... 339.
NetSerial ..... 279.
TeleBridge ..... 338.

TOPS
Flash Card (TOPS Dos) ..... 158.
TOPS FlashBox ..... 109.
TOPS Repeater ..... 115.

Miscellaneous

Aapps Corporation
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Voyager ..... $88.
Carina Software
Interactive desktop planetarium. A dynamic celestial database that lets you command an unparalelled view of the skies from your Mac.

Abaton
InterFax 12/48 ..... 259.
InterFax 24/96 ..... 418.
Quickstep Page Printer ... 3,295.

American Power Conversion
UPS 110SE ..... 268.

Dayna Communications
Dayna Talk Connector ..... 99.
DaynaFile - Single Drive
Df0100 (360k) ..... 498.
Df0200 (1.2Mb) ..... 605.
Df0300 (720k) ..... 605.
Df0400 (1.44Mb) ..... 685.
DaynaFile - Dual Drive
Df0102 (360k/1.2Mb) ..... 729.

HyperTMON ..... $58.
iCOM Simulations
The first debugger for HyperCard's programming language. HyperTalk is a must for both beginning & advanced users alike.

Df0103 (360k/720k) 729
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Df0204 (1.2Mb/1.44Mb) 898

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Intersect Cdr-35 ..... 495.

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Grappler LQ, LS ..... ea. 102
Grappler Mac LX 129
Mac 286 NuBus Card 1,099
Mac 86 NuBus Card 498

Orchid Technology
Orchid Fax Modem ..... 446.

PCPC (8mm Tape Backup)
Jetstream ..... 4,725.

Qume
Crystal Print Publisher ..... 2,950.

Summagraphics Bit Pad Plus
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Access Software
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Accolade
4th & Inches, FastBreak, Grand Prix Circuit ..... ea. 27.
Hardball or Mean 18 ..... ea. 26.

Activision
Cosmic Osmo ..... 41.
Manhole 29
Manhole CD Version ..... 35.

Addison Wesley
The Hobbit ..... 26.
Fellowship of The Ring 26
Shadows of Mordor ..... 26.
Crack of Doom ..... 26.

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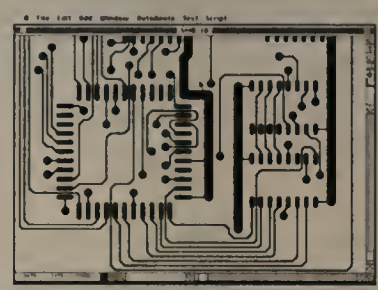

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(continues)

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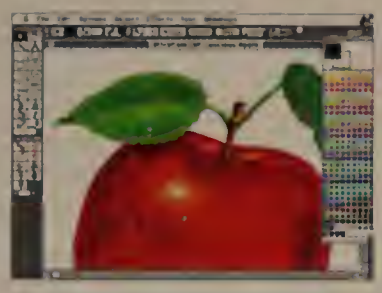

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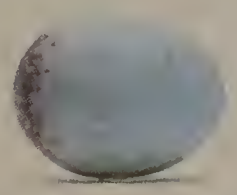

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Quick Tips

Word 4.0 gripe, mismatched laser type, SuperPaint masks, and more

BY LON POOLE

When Paul J. Galanti of Indianapolis couldn't start up his Mac from either of his SCSI hard disks one morning, he went crazy for half an hour. He could start up from a floppy disk, but then neither hard disk icon appeared on the desktop. Finally he discovered that one hard disk was switched off. He switched that drive on and both drives worked perfectly. One of his drives is powered through a switched outlet on the other drive, so that one power switch controls the power to both drives. He must have switched off both power switches when he shut down the night before.

He tried the tests I described last September for determining if his Mac 512KE had the version of ROM (permanent memory) that prevents the Mac Plus from starting unless all connected SCSI devices are switched on. (It did not. The symptoms were wrong anyway; that ROM version completely prevents start-up, but he was able to start up from a floppy. Furthermore, only Mac Pluses built in the first couple of months of that model's production have that first ROM version.)

Similar events baffle Robert H. Fransen of Sherwood Park, Alberta, Canada. He cannot start up his IIcx from a SCSI hard disk unless all connected SCSI devices are on. To save wear and tear, he would like to switch off devices he isn't using.

It may be possible to solve start-up problems with multiple SCSI devices by changing cabling and termination. Try standard termination first. Terminate the first device in the chain. If the Mac has an internal hard disk, that's the first device in the chain and has built-in termination. Terminate the last device in the chain. Do not terminate any devices between the first and last. Be aware that many external hard disks—but not Apple's—have built-in termination that should be removed if the drive is not the first or last SCSI device connected to the Mac. For specific instructions on terminating or removing termination from a SCSI device, see the owner's manual for the device.

Clark Staves / Industrial Graphics

The creator of this drawing used Adobe Illustrator to construct precise ellipses. See "Precision Ellipses."

If standard termination doesn't solve start-up problems, try adding one or more terminators, extension cables, or SCSI devices to the SCSI chain. But I can't guarantee that the right combination of termination and cabling will solve all start-up problems. Some SCSI devices, especially ones made in 1986 or early 1987, simply must be on or the other devices in the chain won't work.

Be sure to switch off all SCSI devices—including the Mac—before connecting or disconnecting any SCSI cables or terminators. Otherwise you're likely to damage the SCSI electronics in the Mac and the SCSI peripheral devices. The damage won't result in immediate failure, but it can lead to a costly repair bill later on.

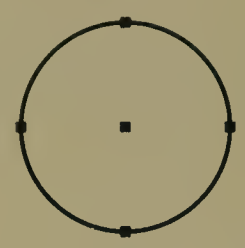
Now suppose you've started up the Mac with a SCSI drive switched off. Later you turn it on expecting to see its icon appear on the desktop. It doesn't. You can use utility software to mount the disk icon on the desktop. If no such utility was included with your disk drive, you can use Apple File Ex-

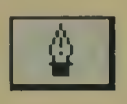
(continues)

PRECISION ELLIPSES

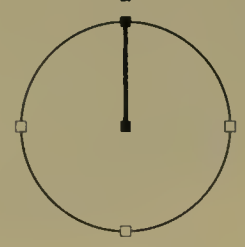
You can construct an ellipse of any angle using Adobe Illustrator (the instructions shown here are for a 30-degree angle). This technique works in any drawing program that lets you freely rotate a line. (The drawing of Telestar 4 at the beginning of *Quick Tips* shows off this technique.)

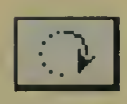
Begin by drawing a circle with the diameter equal to the desired major axis of the ellipse (hold down the Shift key while dragging the circle).



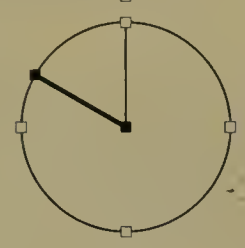


Draw a radius using the Pen tool while holding down the Shift key. Make sure Snap to point is checked under the Preferences menu.

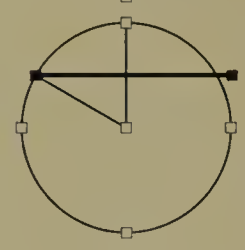


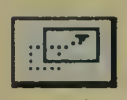


With both ends of the radius highlighted, select the Rotate tool. Hold down the Option key and click the center point of the circle. In the Rotate dialog box that appears, type 60 (90 minus the desired ellipse angle). Then click the Copy button.

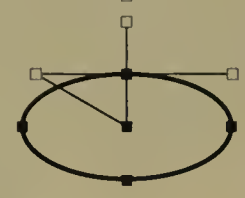


Holding down the Shift key, use the Pen tool to draw a horizontal line from the end of the rotated radius to the other side of the circle.





Select the circle and move it to the front (press Command-=). Using the Scale tool, click the center point of the circle. Holding down the Shift key, select and drag down the top handle of the circle until it meets the horizontal line.



change (it's on Macintosh Utilities Disk 2 of the system software) to mount the drive. Or, you can use the SCSI Probe Control Panel device (available on CompuServe as file SCSI in library 4 of the MACPRO forum and on Connect as file "SCSIProbe cdev" in the file libraries of the Mac Symposium forum).

Spaced Out

Although Word 4.0 is not as buggy as Word 3.0, it has some serious problems. Loris Biaggio of Giubiasco, Switzerland, went back to Word 3.02 because of the way Word 4.0 aligns paragraphs at the tops of pages. Word 3.02 ignores space before a paragraph (as set using the Paragraph command) if the paragraph falls at the top of a page. For example, a heading having 12 points of space before it and falling at the top of a left-hand page would, with version 3.0.2, line up with a normal paragraph having no space before it and falling at the top of the facing page. Word 4.0 never ignores space before a paragraph when that paragraph falls at the top of a page. Using the same example, the heading would appear 12 points below the top margin, while on the facing page, the normal paragraph would appear at the top margin. Working around this problem is awkward, time-consuming, and partially defeats the usefulness of style sheets. You don't define headings with extra space before them. Instead, you scroll to each heading in turn, select the paragraph that precedes it, and add extra space after that paragraph.

More Memory and MultiFinder

Q A while back I increased the memory in my Mac Plus to 2.5 megabytes. Naturally, I decided to try MultiFinder. Suddenly many of my former routines didn't work: DiskTop could not open files with a double-click; the StdFile XCMD did not preset the folder in HyperCard; and HyperTalk's Open command wouldn't open a document of an application that was already open. What to do?

With System 7.0, will 2.5 megabytes still be enough to run MultiFinder? Can I add more memory to my Mac Plus without damaging the power supply or overheating?

James L. Swanson
Banff, Alberta, Canada

A You can safely increase memory to 4MB. The four 1MB SIMMs involved draw about the same amount of power and generate the same amount of heat as the four SIMMs now in your Mac (two 1MB and two 256K). I think you'll want the extra memory. It wouldn't surprise me if System 7.0 on a Mac Plus took up a good megabyte more than System 6.0.3 does. Furthermore, applications keep getting larger.

When you upgrade your system software (or start using upgraded features), you may also need to upgrade some of your applications. For example, DiskTop 4.0 opens files with MultiFinder active whereas the previous version (3.0.4) does not. The HyperTalk Open command does behave in HyperCard 1.2.2 as you describe; perhaps in HyperCard 2.0 it will work as you wish. Other problems may be caused by something unrelated to the system software version. The StdFile XCMD works fine for me using HyperCard 1.2.2 with MultiFinder 6.0.3.

Export Laser Prep

Q I know you can generate a PostScript file instead of printing on a LaserWriter. Is there any way to include the PostScript code from the Laser Prep file? I would like to print Mac documents on a QMS PostScript printer from an Amdahl minicomputer running UNIX. I don't want the Laser Prep to remain in the QMS printer after a print job finishes.

Paul Lucas
Lisle, Illinois

A First, use the Chooser to choose a LaserWriter and to turn off background printing (if it's on). If you're using a third-party print spooler, deactivate it for now. Next, choose Print from the application's File menu. Click OK in the Print dialog box and immediately press ⌘-K. (For a PostScript file without the Laser Prep file, press ⌘-F.) Keep pressing until you see the message Creating PostScript® File. If the document prints instead of the message appearing, you didn't press ⌘-K fast enough. This procedure creates a file with a name like PostScript0. If you can't find it, use the Find File desk accessory.

Mysterious Mismatch

11-point LaserWriter output at 200 percent

does

11-point LaserWriter output at 100 percent

does

Both examples have been enlarged to make the differences more visible

These two samples of 11-point Palatino type do not exactly match. The left sample was printed at 200 percent—effectively making it 22 points—on a LaserWriter IINT and then photostatically reduced 50 percent. Because it was printed at 22 points, it does not use Adobe's built-in hints that enhance the quality of type printed at small sizes. The right sample does use the hints because it was printed at 100 percent on a LaserWriter IINT.

Masked Paint Objects

TIP: As the SuperPaint 2.0 manual mentions, bitmapped (paint) objects have a transparent fill when pasted into the draw layer. The manual describes a painstaking method for creating a mask using the Freehand Bezier tool. Creating a mask is far easier with the AutoTrace command in the Paint menu. ["Mask" illustrates the effect.]

To create the mask, select the bitmapped artwork in the paint layer and use the AutoTrace command to send an outline of the selection to the draw layer. Next, go to the draw layer and choose Group from the Draw menu, which allows you to treat the outline as one object. In the pattern palette, select solid white for both the line and fill of the mask. Now go back to the paint layer, select the bitmapped artwork again, and choose either Copy to Drawing or Cut to Drawing from the Edit menu. Finally, return to the draw layer, select the bitmapped artwork and its mask, and use the Group command to make them one.

Furman S. Baldwin
Cornwall-on-Hudson, New York

Mask

Bitmapped artwork like this skull is normally transparent when pasted into SuperPaint's draw layer (left). A white or solid-color mask created by the AutoTrace command and placed behind the artwork makes the artwork opaque (right).

If your artwork lacks a solid perimeter, using this method yields an incomplete mask. Also, the AutoTrace command sometimes creates a very complex drawing—lots of objects in the mask—that will slow down SuperPaint appreciably. You may be able to lessen this side effect by using the AutoTrace Settings command (Paint menu) to select the Outline Only option. And if an autotraced mask turns out to be slightly too big, you can try making its line pattern the same as the fill pattern of the object behind it in the draw layer.—L.P.

Changes to Reduced Type

TIP: Some people print camera-ready copy at 200 percent on a laser printer and then have it photostatically reduced back down by 50 percent, improving the final resolution. If you make a last-minute change by pasting in some type, be sure to print your change at 200 percent and have it photostatically reduced before pasting it in. Otherwise, the insert may not match the rest of the type [see "Mysterious Mismatch"]. This happens because Adobe and some other PostScript fonts include special instructions, called hints, that improve the look of a typeface in small sizes. Usually, the hints make very thin lines slightly thicker and add more space to counters (open spaces). The hints are not used for the larger sizes you typically get when printing at 200 percent.

J. Michael Marriner
San Francisco, California

EasyTalk

TIP: To play two-player games like Strategic Conquest, you must connect two Macs. Instead of using LocalTalk or PhoneNet connectors, you can run a standard printer cable between the printer ports of the two Macs.

John Willis
Frederick, Maryland

Directly connecting two Macs works OK at distances less than 25 feet or so. You can even connect a Mac to a LaserWriter with a standard printer cable (Apple part M0197). LocalTalk connectors and PhoneNet connectors contain transformers that electrically isolate the machines on the network while still allowing the machines to send and receive information. The connectors also incorporate noise-suppression and ground-protection circuitry.—L.P.

We pay from $25 to $100 for tips published here. Send tips or questions (include your address and phone number) to Quick Tips, Macworld, *501 Second St., San Francisco, CA 94107. Send electronic mail to CompuServe (70370,702) or MCI Mail (294-8078). All published submissions become the property of* Macworld.

Lon Poole answers readers' questions and selects their tips for this monthly column. His many personal computer books include HyperTalk *(Microsoft Press, 1988) and a new book of Mac tips (to be published soon by Microsoft Press),* Amazing Mac Facts.

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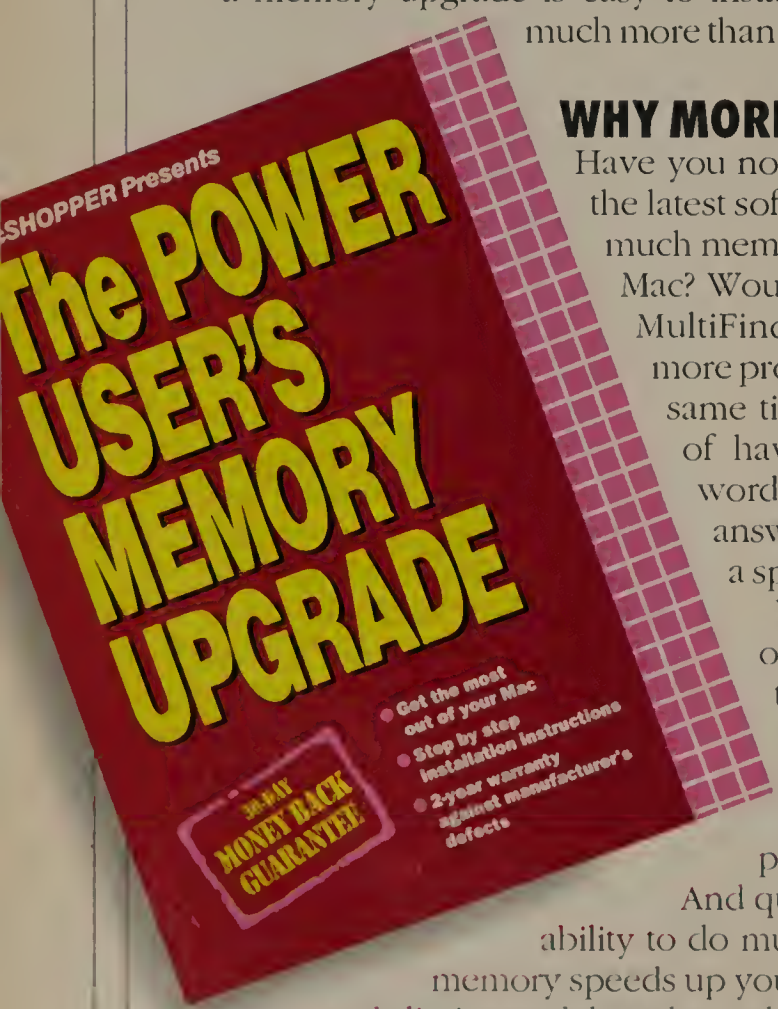

WHY MORE MEMORY?

Have you noticed that some of the latest software requires too much memory to run on your Mac? Would you like to run MultiFinder plus two or more programs — all at the same time? Are you tired of having to quit your word processor just to answer a question from a spreadsheet?

Well, added memory is a must! Join the thousands of Mac users who are taking advantage of low SIMMs prices right now.

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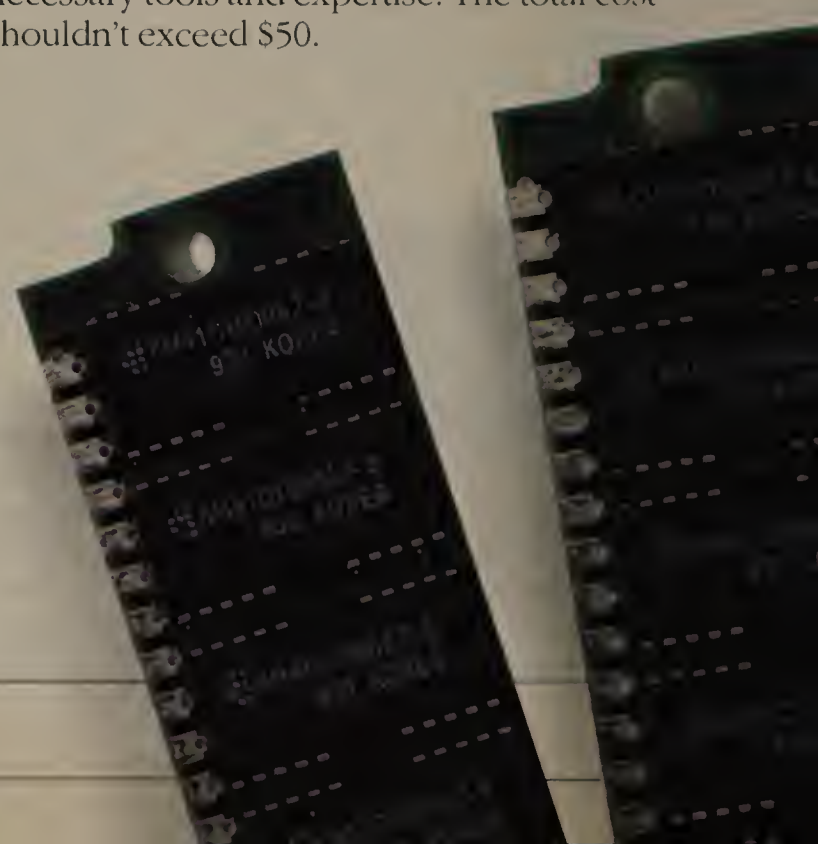
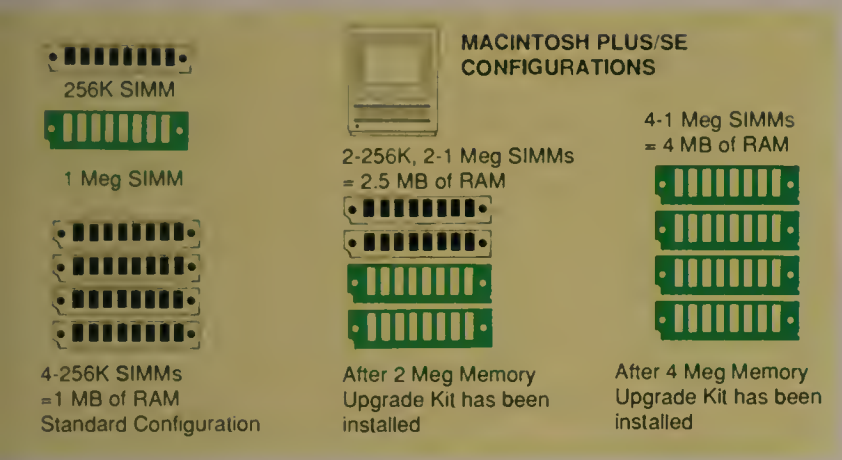
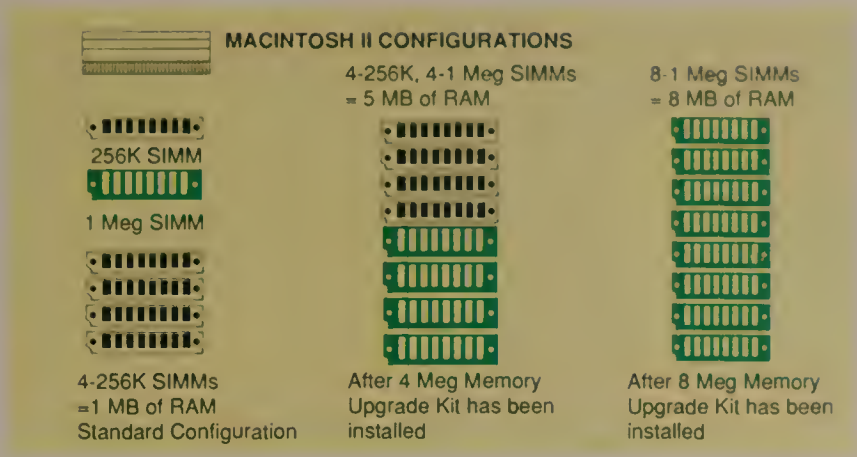
If you prefer, you can have a computer store install your SIMMs for you. Their service technicians have the necessary tools and expertise. The total cost shouldn't exceed $50.



The Mac Plus and Mac SE have four available slots on the motherboard, which originally contain four 256K SIMMs modules — totalling 1 megabyte (1MB) of memory. To upgrade, you can replace each 256K module with a 1MB module, but you must do this in pairs.

Replace two 256K modules and you will have a total of 2.5MB of memory. (That's the two new 1MB modules plus the original two 256K modules.) Replace all four modules and you'll have 4MB. (You should save the 256K modules for later use if you want to pass your Mac on to someone else.)





The Mac II, IIx, IIcx and SE/30 each come with a total of eight slots. The standard configuration has four 256K SIMMs modules, or a total of 1MB. Here, memory must be upgraded in multiples of four. This allows for expansion from 1MB to 4MB, 5MB or 8MB.

Remove the four 256K modules and replace with 1MB modules and you have 4MB. Leave the original modules and add four 1MB modules and you get 5MB. Removing the original modules and adding eight new 1 MB modules will bring you to 8MB of memory.

FAST, FASTER, FASTEST

SIMMs come in different speeds and are calibrated in nanoseconds (ns) from 70 to 120ns. Anything faster than 120ns doesn't much help any Mac but the IIci. The system doesn't respond any faster anyway. But you can always take your memory chips with you when you move on to a new Mac, so there may be an advantage to speed at a later date.

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MacShopper buyers and agents scour the world in search of top quality components for our SIMMs modules. They're supplied only by top grade manufacturers like Samsung, Siemens, Texas Instruments, Fujitsu, Intel, etc. Each unit is tested for performance, quality and noise, in temperatures from freezing to 158°F.

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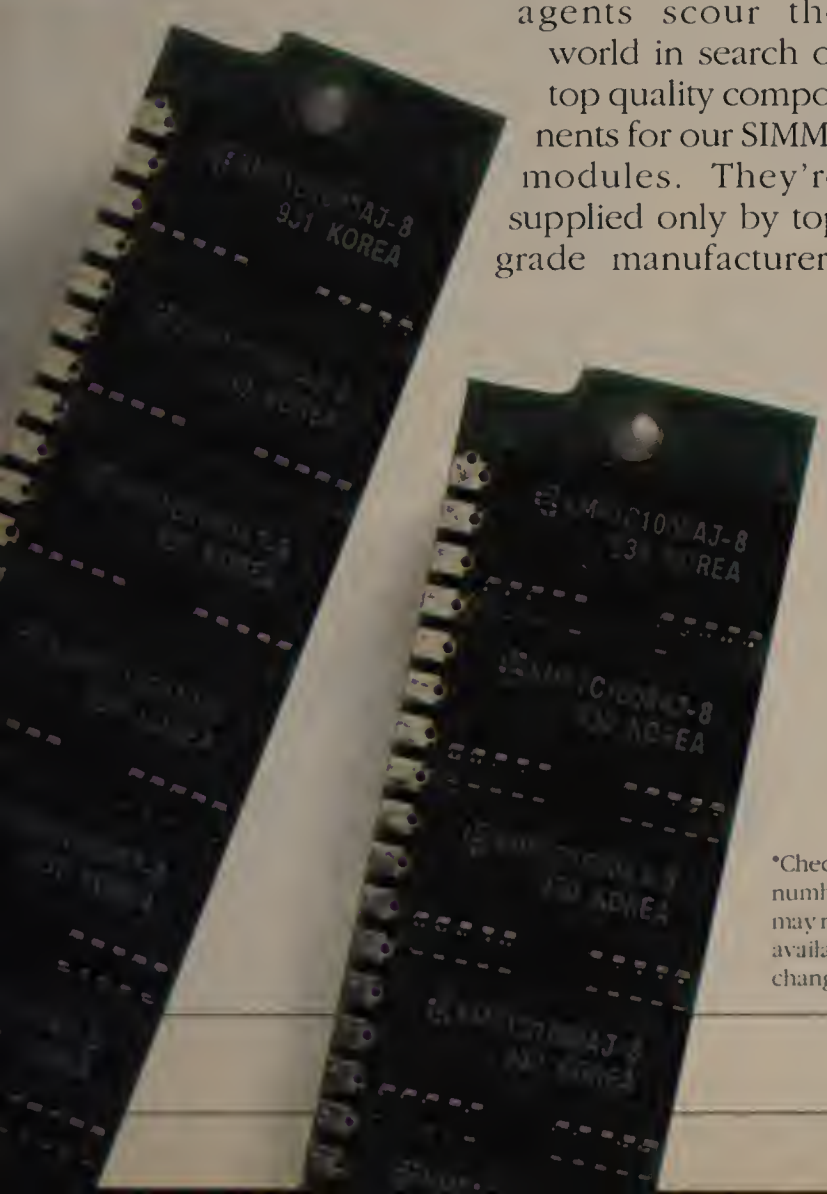
*Check the chart for the number of modules you may need. Price and item availability are subject to change without notice.



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Getting Started with Disk Maintenance

How to stay on speaking terms with your disks

BY JIM HEID

A floppy or hard disk is like a friend you can't quite trust. Most of the time, disks are faithful computing caddies that hold our software and documents. Over time, it's easy to become smug about this give-and-take relationship. Then one of them develops a case of amnesia, and all of a sudden it's "Files? What files? I don't have any files."

The fact is, disks can betray your trust in a variety of ways. Their microscopic magnetic particles can be led astray by magnetic fields produced by loudspeakers, telephones, electric motors, and the Mac's own power supply. They're susceptible to system errors and program bugs, both of which can cause inaccurate information to be written to the disk. They face physical threats from spilled soda to dust to extremes of heat and cold. And hard disks can fall victim to *head crashes*, in which the read-write heads strike and damage the media surface.

How do you maintain a relationship with such fair-weather friends? Use an umbrella—a *backup utility*, which stores copies of your files on floppy disks or other storage devices. Backups are to computers what vice presidents are to governments: they don't do much when the sailing is smooth, but when the worst happens, they're indispensable.

And since a good vice president isn't always around when you need one, every software library also needs a *file-recovery utility*. One of these rescue squads can save the day if disk problems occur or if you accidentally throw away a file in between backups.

SCOTT BALDWIN

Last month we toured the world of utilities—programs that make the Mac easier and more convenient to use. This month, I'll take a closer look at backup and file-recovery utilities, and show how to use both to make your disks more trustworthy companions.

Backup Basics

Backing up floppies is easy, especially if your Mac has two floppy drives. First, lock the original disk by sliding its plastic *write-protect* tab so you can see through the square hole. Then insert the original disk in one drive and the backup in the other and drag the original disk's icon to the backup's icon. When the Finder asks if you want to replace one disk's contents with those of the other, click OK. When the copy is complete, eject both disks; unlock the original if you plan to write to it again.

If your Mac has just one drive, the floppy copy routine is a bit trickier. To avoid excessive disk swapping, follow these steps. First, insert the backup disk and then choose Eject from the File menu. (The Finder dims the disk's icon to indicate it still "knows" about the disk.) Next, lock the original disk, insert it, and then drag its icon to the backup disk's dimmed icon. When the Finder asks if you want to replace the backup disk's contents, click OK. (You will need to swap disks a few times during the copying process.)

Backing up a hard disk is, well, harder. To back up a full 40MB drive,

(continues)

you'll need about 50 800K disks—and about an hour. Most people can think of better ways to spend their time and disk money. Until their hard disks crash, that is.

But thanks to the Mac's ability to keep track of the date and time files are created and modified, you need not back up an entire hard disk during each backup session. Backup utilities can read the Mac's digital datebook and back up only those files you've added or changed since the last *full backup*. This task, called an *incremental backup,* takes far less time than a full backup.

Backup Helpers

Every Mac comes with a barebones backup utility, HD Backup, that lets you perform full and incremental backups to floppy disks. Virtually all non-Apple hard disks include backup software, too. And several software firms offer backup programs that work with any SCSI hard disk. Each program handles the chore differently.

The most basic difference concerns how the backup program copies files to your backup media. Some programs, including SuperMac Technology's DiskFit and Magic Software's Backmatic, copy each file separately and then create on each backup disk a *catalog file* that the program can use to *restore* the files to the hard disk. On the backup disk you'll see each file just as it existed on your hard disk. Need to restore a few files? Simply use the Finder to copy them from the backups to your hard disk. (If a given file won't fit on a single disk at backup time, the utility splits it across multiple disks; you must use the utility to restore such a file.)

Other programs, including Fifth Generation Systems' Fastback II, Dantz Development's Retrospect, and Microseeds Publishing's Redux, copy your files into one large file that spans all your backup disks. Instead of using the Finder, you run the backup utility and tell it to locate and restore the files you need.

With the separate-files approach used by DiskFit and Backmatic, you can restore any file that fits on a single backup disk without having to run the backup utility. You'll appreciate that if the utility's master disk becomes damaged, or if you take your backup disks to another machine but forget to take along a copy of the utility.

With the one-file-holds-all approach, if you don't have the backup utility, you don't have any backups—but it does make possible faster backup sessions and some fancy backup gymnastics. Retrospect and Fastback II, for example, can *compress* files as they back them up, reducing the number of backup disks required. Fastback II can also record special error-correction codes that enable the program to recover data from damaged backups. Fifth Generation Systems claims Fastback II can recover all the data from a backup disk even if up to 10 percent of its contents are damaged.

Incremental Differences

Another factor to consider is whether the program saves or deletes older versions of files you back up. For example, say you begin writing a proposal on Monday morning and then do a full backup on Monday evening. You work on the proposal again on Tuesday and then do an incremental backup. What happens to the backup of Monday's version?

It depends on the program you use. DiskFit and Redux replace older versions of files with their newer versions. That keeps your mountain of backup disks from growing too high, but it also eliminates the option of going back a few days to an earlier version of a file. If you decide Tuesday's version of your proposal stinks —or worse, if your word processing program somehow scrambles the file, and you unknowingly back up the scrambled version—you don't have Monday's version to fall back on. (I'll present a workaround for this potential nightmare shortly.)

By contrast, Retrospect and Backmatic don't replace earlier versions of files. Fastback II lets you choose whether older versions should be deleted or saved. That gives you an extra-strong safety net, but it also means you need more disks to hold your backups. That could be significant if you're backing up large files such as scanned images.

Choosing Your Backup Weapon

Here are some other points to address before buying a backup utility.

- Network support. If you use network software like TOPS or AppleShare, you'll want a backup utility that supports it. For example, to back up an AppleShare file server, look for a utility that backs up each folder's access privilege information. Retrospect and SuperMac's Network DiskFit do.
- Backup selectivity. If you want to rely on your original application disks as backups, you can back up documents only and cut your backup time. But some programs give you more flexibility than others in choosing files to back up. DiskFit and Network DiskFit are the least flexible, offering just two backup choices: applications and system files only, or documents only. Fastback II, Redux, and Retrospect enable you to be extremely selective. Backmatic doesn't back up application files at all, and it lets you exclude specific types of documents (such as all Excel files) as well as specific folders.
- Media support. If you plan to use a backup medium other than floppy disks, be sure to buy a program that supports your chosen medium. (To find out what other media are available, see "Media Circus.") Retrospect can back up to virtually anything. Fastback II, DiskFit, and Redux support tape drives, as long as they display tapes as icons on the Finder's desktop.
- Unattended operation. If you use a file server in a busy office, you might want to back it up at night, when it's idle. If so, you'll need Fastback II or Retrospect. Both let you specify intervals for unattended backups (see "Scheduled Maintenance"). But since no one will be around to shuffle floppies, you'll need to use a high-capacity backup medium such as a second hard disk or a tape drive.
- Programmability. If you have very specific backup needs—perhaps you want to back up all PageMaker and Excel documents at 8 p.m. every Tuesday—consider a program that lets you automate the types of backups you do. Retrospect and Fastback II offer the strongest automation features. Redux finishes second.
- Ease of use. Backing up is boring; a program that's difficult to learn won't encourage the practice. Alas, ease of use and power are at opposite ends of the seesaw. The two most powerful

(continues)

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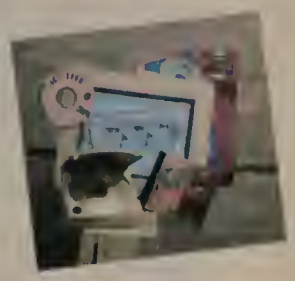

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backup programs—Fastback II and Retrospect—have steep learning curves. If your backup needs don't demand automation and sophisticated file-selection features, consider a simpler program. Redux strikes an excellent balance between power and simplicity. DiskFit and Network DiskFit are a breeze to use, but they don't allow you to be very selective.

Backmatic is an elegant little utility. It's a start-up document (an INIT) that intercepts the Mac's shut-down process. Choose Shut Down, and a dialog box asks if you want to back up the files you worked on that day. Click Yes, insert floppies as needed, and Backmatic does the rest. You can't beat it—provided you don't need to back up applications or files that won't fit on a single floppy disk. (Version 1.1, in development at this writing, will be able to split large files on multiple disks and will offer features designed for backing up Macs on a network. It will also monitor battery power on the Macintosh Portable, suggesting you back up when power drops below a specified point.)

MEDIA CIRCUS

If your hard disk holds more than 40MB—or if you lack the patience for shuffling floppies—consider an alternative backup medium. One possibility is a second hard disk. Today you can buy two 40MB drives for less than what one 20MB drive cost a few years ago. And you'll have a spare drive if the first one acts up.

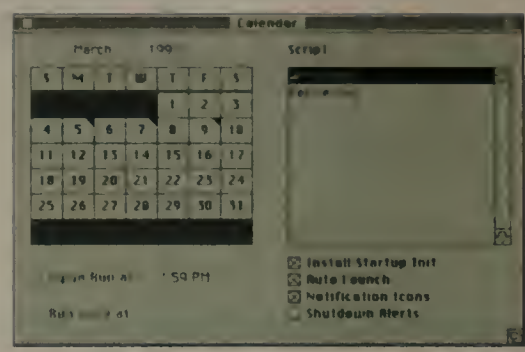
Another alternative is a *tape drive* such as GCC Technologies' HyperTape or Archive Corporation's MaxStream. Their primary strength: capacity. Most tape drives store between 40MB and 300MB on cassettelike tape cartridges. Some drives, such as Personal Computer Peripherals Corporation's PCPC Tape Backup, use 8mm video cassettes that hold over 2000MB. Their primary weakness: performance. Locating a specific file on a tape cartridge can be slow since the drive can't randomly access any point on the tape.

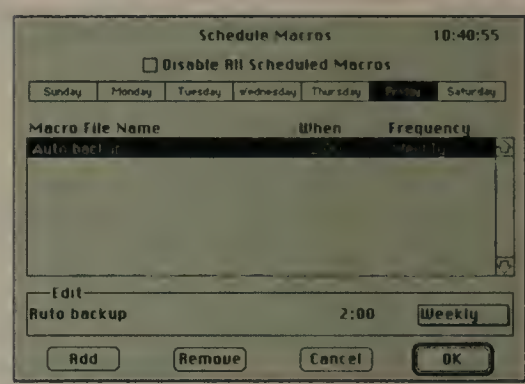
The most versatile backup device is a *removable-media* drive such as Iomega's Bernoulli Box or Mass Microsystem's DataPak. (The DataPak uses a popular removable hard disk technology developed by Syquest; other drives that use it include Ehman Engineering's 45MB Removable Hard Drive and PLI's Infinity 40 Turbo.) These combine a hard disk's speed and capacity with the insert-and-eject convenience of floppies (see "Hard Disk Alternatives," *Macworld*, July 1989). And unlike tape drives, removable-media drives can be used as a primary storage device.

Backup Plans

How will you use your backup program? You'll probably start by doing a full backup, following up with incremental backups at regular intervals. Here are some guidelines and tips.

- Make two backups. Your backup disks are prone to the same ailments as your originals. For extra safety, make two backups, and alternate them (see "Backup Strategies"). And consider keeping one set in a different location, for added protection against theft as well as fire and water damage.
- Use the Control Panel's disk cache. Most backup programs run faster when the Mac's disk cache is on. If your program's manual doesn't provide cache-size guidelines, try 64K. Restart your Mac after adjusting cache settings to put them into effect.
- Create an emergency-restore floppy disk. Put copies of the Finder, the System file, and your backup utility on a floppy disk. If your hard disk crashes, you can start up with this floppy and use it to restore your files. (Depending on how your hard disk crashed, you





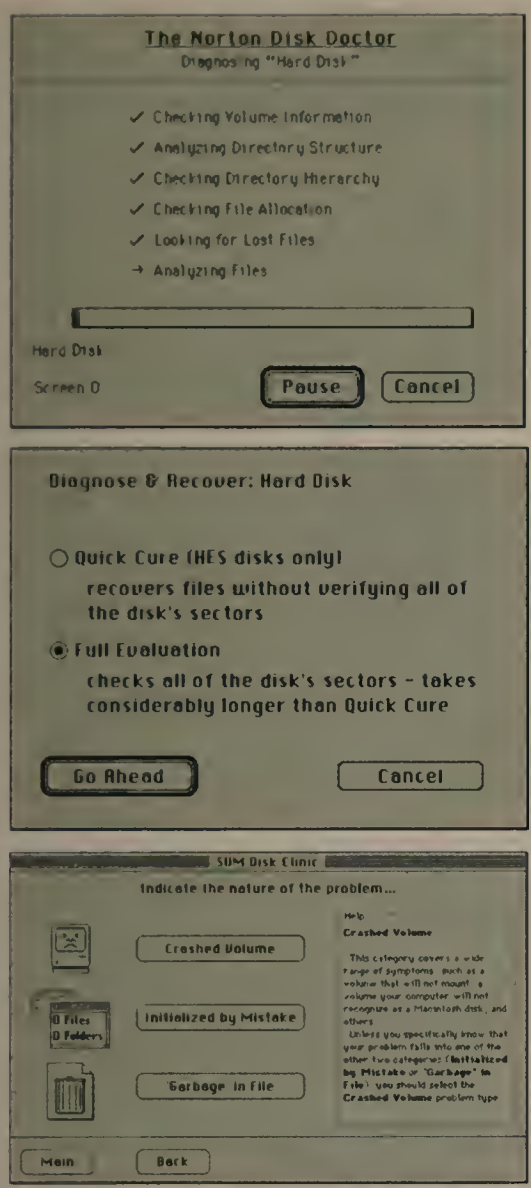
Scheduled Maintenance
Retrospect (top) and Fastback II (bottom) do automatic backups at regular intervals—provided your backup medium can hold all the files that will be copied. Retrospect's Auto Launch option causes the program to start itself up at a specified time.

BACKUP STRATEGIES

S	M	T	W	T	F	S
28	29 IB-1	30 IB-2	31 IB-1	1 FB	2 IB-1	3
4	5 IB-1	6 IB-2	7 IB-1	8 IB-2	9 IB-1	10

Full backup
Incremental backup 1
Incremental backup 2

One technique for backing up a hard disk is to rotate among three well-marked sets of backup disks or other media. With this technique, if one set of backups goes bad, you have two other sets to fall back on.



Recovery Tools

Three software rescue squads in action: Norton Utilities (top), Disk 1st Aid (middle), and SUM II (bottom).

may first need to reinitialize it using the software that accompanied it.)

- Don't forget customized files. To save time, you may want to tell your backup program to ignore files in the System Folder. That's a good idea, provided you don't forget to back up the custom files that may also live in the System Folder. Such files include word processor spelling-checker dictionaries that contain your own entries, preferences files that store your application preferences, the Scrapbook file, and the System file itself, which contains your fonts and desk accessories.
- Verify your backups. Most backup utilities have a *verify* option, which, when active, causes the program to proofread its work as it backs up files. If a disk error causes a file to be written inaccurately, the verification process catches it, and the utility tries again. Verification lengthens the backup process, but that's a small price to pay for more reliable backups.

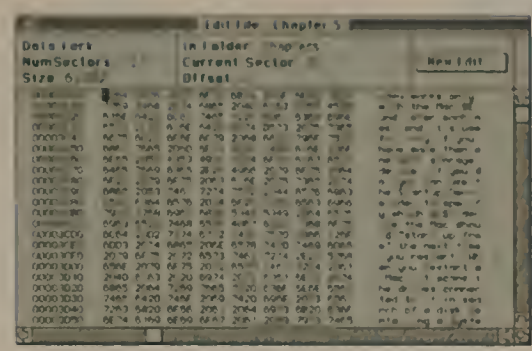
Digital Doctors

What happens if you lose a file in between backups? If you're smart, you'll reach for a file-recovery utility such as Symantec's Symantec Utilities for Macintosh (SUM), 1stAid Software's 1stAid Kit, Central Point Software's PC Tools Deluxe for the Macintosh, and Peter Norton Computing's Norton Utilities for the Macintosh (scheduled to appear in February). These products can often repair and resurrect damaged disks and files. They do so by working intimately with the *reserved areas* of a disk—areas that don't store documents or applications but instead hold information the Mac uses to keep track of files.

Reserved areas have technical names like *volume allocation bitmap* and *extents b-tree*. The Mac takes these magnetic tables of contents at face value; it assumes they're intact and contain valid data. When they don't—when a system crash, program bug, or stray magnetic field scrambles their contents—the Mac may be unable to retrieve part or all of the disk's contents. File-recovery utilities can analyze these areas and often correct inaccurate entries and thus retrieve files that the Mac thinks are gone (see "Recovery Tools").

The aforementioned products can also save the day when you accidentally throw away a file. All three include INITs that spy on you as you use a disk. When you delete a file, the INIT makes notations on disk that indicate where that file is physically located on the disk. The file is still there; the Mac has simply removed its entry from the disk's electronic table of contents. Should you need to resurrect the file, you run the file-recovery utility, which reads those notations and recreates the file's table of contents entry. (Prosecutors for the Iran-Contra trial used similar techniques to resurrect memos Oliver North *thought* he'd deleted from his word processor.)

But there is a catch: if you worked extensively with the disk after deleting the file, some of its contents may have been replaced by newer files. So when you realize you've accidentally deleted a file, stop using that disk until you can run the recovery utility. Even if a recovery utility can't automatically resurrect a file, there's still hope. All three products include *disk editors*, which let you directly view and alter the disk's contents (see "Disk Editing").



Disk Editing

When a file-recovery program's automatic recovery features fail you, turn to its disk editor (SUM II's is shown here). By searching for text present in the lost file, you may be able to locate some or all of its data and copy it to a new file—or at least retype it. The four-character columns in the left portion of the display show each character's hexadecimal value, while the rightmost column shows the characters themselves. The hexadecimal value selected here (6) is part of the two-character value that represents the letter c.

The previous paragraphs contain several *oftens* and *maybes*. The fact is, file-recovery utilities don't always succeed. A visit to a doctor isn't a substitute for good health habits, nor can a file-recovery utility replace a good backup routine.

And speaking of good health habits, keep disks—floppy or hard—away from excessive moisture, stray magnetic fields, extremes of heat or cold, and dusty environments. Pack them securely for shipping. (Save your hard disk's original box or your Mac's box, if you have an internal drive.) If you move them from one temperature extreme to another, give them time to acclimate before using them. And never move or jostle a hard disk while it's on.

Following these common-sense precautions can lessen the chances that you'll need to restore data from backups or use a recovery program. In short, disks may be fair-weather friends, but you can control the weather. ◻

Jim Heid is a Macworld *contributing editor who each month focuses on a different aspect of Mac fundamentals. His latest book, coauthored with Peter Norton, is* Inside the Apple Macintosh, *an advanced user's guide to the Mac, published by Brady Books.*

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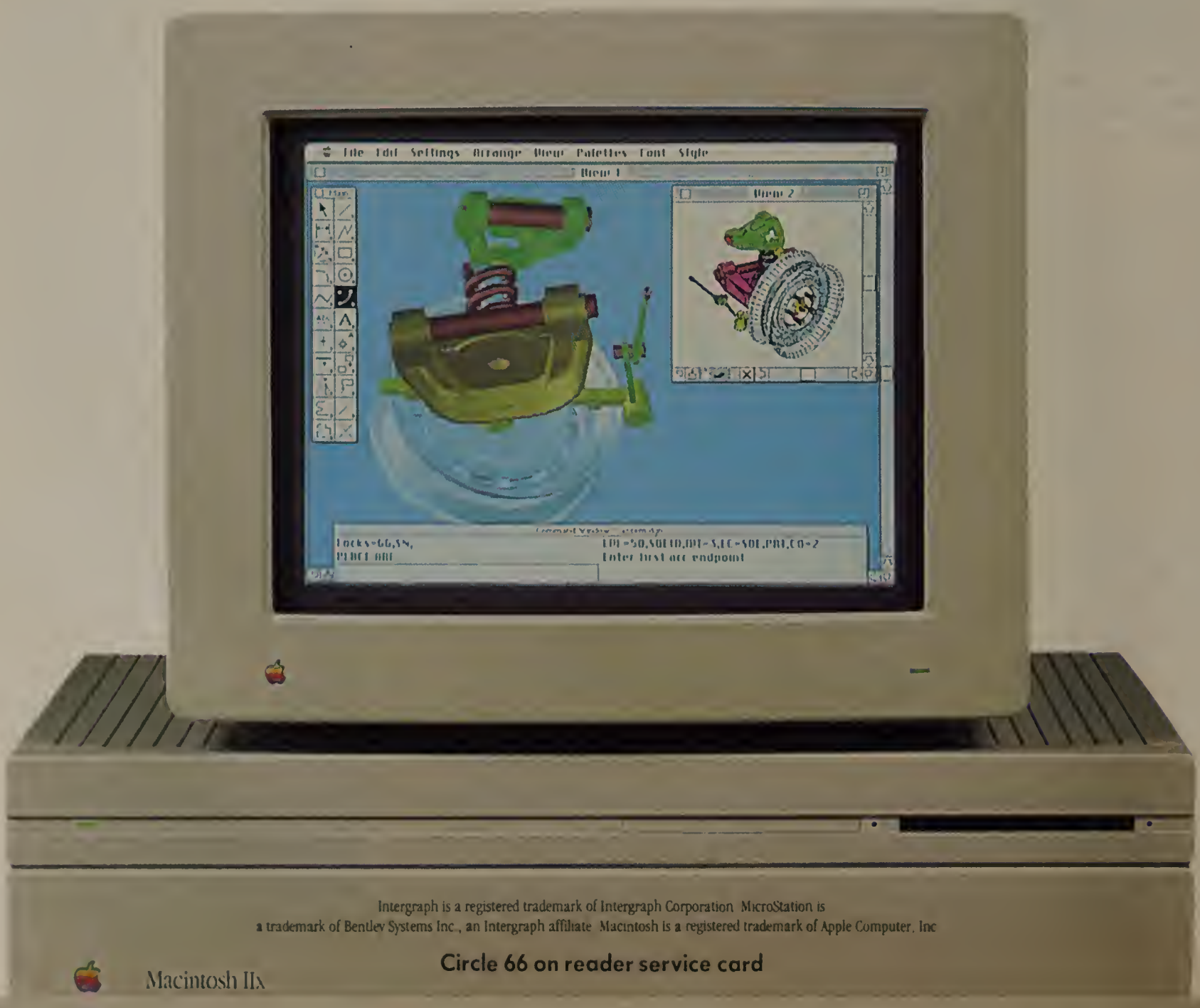

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Macintosh IIx

Insights on Wingz 1.1

SPREADSHEET TIPS FOR FREQUENT FLYERS

BY CHARLES SEITER

Wingz gave Mac enthusiasts the splashiest new-product introduction the marketplace has yet seen, and when Wingz actually arrived it proved that there was something quite spectacular behind all the spaceships, tour jackets, and other paraphernalia. Version 1.1 offers formatting and charting enhancements, better SYLK file support, improvements in the already impressive HyperScript language, and other useful new touches such as autosave and object locking. Here's an assortment of tips to help you get the most from Wingz. Thanks to Informix staffers Keith Brown, Kathleen Burnham, Keith Goosey, and Kevin Long for their help in preparing this column.

HyperScript Tips

Although HyperScript is an easy language to read and write, you still must expect to spend a certain amount of time debugging scripts if you want to create your own functions. A straightforward approach to script debugging is to load the script file with the Get Script command, which makes it available for editing and testing, and then clear it with Remove Script.

A faster technique is to use Open Script to identify the file and Run to load it. The function you're implementing in the script is now available to be called, just as it is with Get Script, but with the added benefit of retaining variables and their assigned values in memory. Thus, you're better able to see what your function is actually doing; you can insert a few reporting steps in the script to inspect intermediate values as well. When you compile the script, you lose the variable assignments, so you should postpone compiling until you are satisfied that your function has been tested sufficiently.

Graph Fix

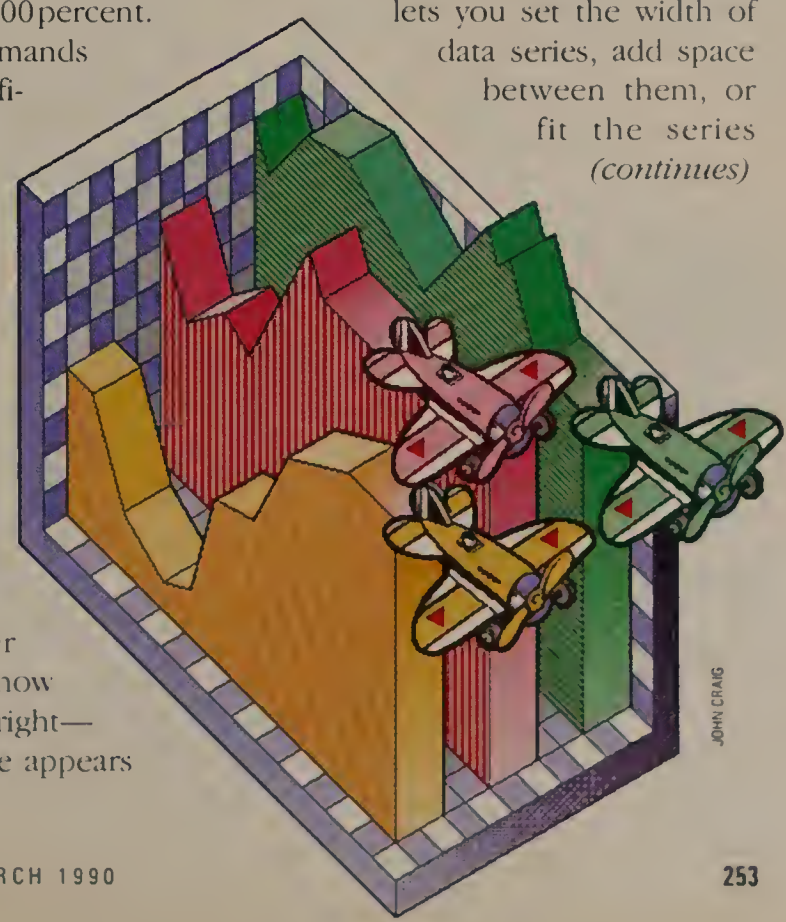
Wingz can create dramatic 3-D graphs, but they can look jagged when pasted into other applications. For smooth graphics-file exporting, select the Scale command from the Window menu, choose 400% from the pop-up submenu, and then choose Copy. Copying to the Clipboard this way effectively gives you 300-dots-per-inch resolution on the selected object when you paste it into the other application, rather than the 72-dpi screen resolution you get by scaling at 100 percent.

Wingz graphing commands allow for fairly easy modification of graph types. The standard XY chart expects only one set of data points (x,y), but there is a way to plot multiple data sets. First select two contiguous columns of data, an x column and a y column. Create a chart with the chart tool and change the chart type to XY (a Gallery choice under Graph). The chart will show a single legend at the right—click on this and a circle appears on it, showing that the y data series has been selected. Now pick Add Series from the Series submenu under Graph. Hold down the ⌘ key, reselect your x series and select the range of data for the second y series (this can be anywhere on your spreadsheet). Release the ⌘ key and select Range from the Series submenu. The line representing the new y series will appear on the chart (see "The Plot Thickens").

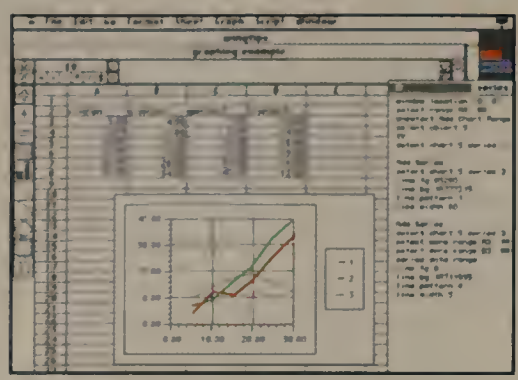
You may want to generate some scripts as you go along, giving yourself macros for 2-, 3-, 4-, and 5-series XY charts. Just pick New Script and Learn as you produce a 5-series chart, and then delete script sections from the end to produce scripts for the simpler charts.

The default settings for 3-D graphs work well for simple data sets, but to make presentation-quality graphics in more complex cases you should experiment with the Chart Info command under Format. Chart Info lets you set the width of data series, add space between them, or fit the series

(continues)



JOHN CRAIG



The Plot Thickens

You can add extra data series to an XY chart in Wingz by using a simple set of commands. Better still, you can capture the commands and line-by-line formatting as a script (shown at right)—then you just run the script the next time you need this type of multiline XY chart.

side by side with no spaces (see "Period of Adjustment"). After making these width and spacing adjustments, you will also want to experiment with the View submenu under 3D Info—this is how you change the viewing perspective on the 3-D bars in the chart picture.

Formatting Matters

Wingz has a set of formatting defaults that, like much of the rest of the program, can be customized. The defaults are contained in a HyperScript file called Startup, which normally contains some script items for adding functions (Cell Size, Delete Block, Insert Block, and Text/Value Conversion) to the default Sheet menu. You can add any HyperScript command to Startup. One common variation is a command for selecting a different default text font. For example, to change the default font to Times, simply add the command

```
text font "times"
```

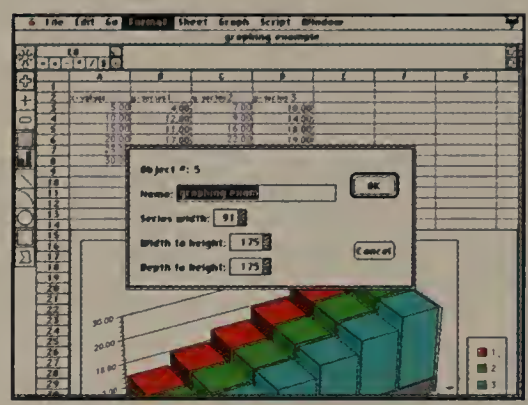
to the Startup Script. You could, if you liked, select colors, borders, and other formatting defaults. Before tinkering, make sure you have a copy of the standard Startup Script somewhere.

Another, more flexible, way to change formats is to record a set of formatting defaults as a HyperScript file and run the script in this file after you open a spreadsheet in the usual way.

One thing you may want to do fairly often in Wingz is clear a block of cells but retain its formatting information. If you simply choose Clear after selecting the block, all formatting is lost. To save formatting in Wingz 1.0, you had to select the block and then choose Copy, Clear, and Paste Format from the Edit menu. Wingz 1.1 has added a new Edit command, Clear Special, that lets you retain your choice of formatting, data, or formulas. The new version also has a Paste Special command that provides a simple way to convert a block of formula results to plain numbers.

Imported Goods

Many Wingz users have occasion to translate files from the PC program



Period of Adjustment

You can change the shape and spacing of the blocks in a 3-D bar chart with the obscurely located Chart Info command under Format.

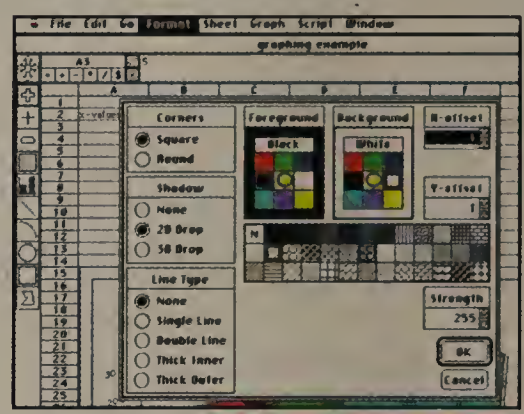
Lotus 1-2-3, since Wingz can deal directly with Lotus's WKS and WK1 format files. Wingz can also read and write SYLK files, making it easy to exchange files with Microsoft spreadsheets. If you get an unable-to-read-file-format error message during the import process, that's because the Wingz file-import function can't handle the null characters contained in most Lotus files. To get around this problem, just import Lotus files through the Apple File Exchange utility (included with System 6.0), which automatically removes null characters.

Another import glitch can occur if Wingz is set to read a tab-delimited text file that has been padded with spaces or nulls to maintain fixed-length fields. This sometimes happens when a database program, for example, is told to save a file as text. Wingz sees the spaces and thinks it's seeing character fields. The fix for this lies in a new choice on the Sheet menu called Text Value Conversion. Added by the Startup Script, Text/Value Conversion evaluates all cell entries and decides which of them were actually intended to be numbers, accidental leading spaces notwithstanding.

Print Hint

To print page numbers at the bottom of each page of a multipage printout, put the character pair &P in any cell and then select the cell. Choose the Report command from the Sheet menu, and then the Report Footer Range selection from the Report submenu. These commands make the program print the correct page number as a footer, which you can also position (left, center, right) with commands from the Report submenu.

The Wingz spreadsheet printing default gives you a border around your printout. You can hide the border using these two sets of steps: first, choose the Select command from the Go menu and select the Report Border option from the submenu (you have to scroll down to find it); second, from the Format menu choose Border and pick None from the luxuriant choice of possible border styles (see "Border Patrol").



Border Patrol

There have been few programs since the dawn of computing with such elaborate facilities for producing borders on printouts as Wingz. If you follow the sequence of steps listed in the tip, at long last you reach this dialog box from which you can select None as well as fancy types.

Sharing the Wealth

If you've found a tip or shortcut not mentioned here, spread the word to other *Macworld* readers by sending it to *Quick Tips, Macworld*, 501 Second St., San Francisco, CA 94107. ■

See *Where to Buy* for contact information.

Charles Seiter is a Macworld *contributing editor and beta-tester of many Mac spreadsheet programs. His primary interest is in macro programming for scientific applications.*

QUALITY TIME

You Have Better Things To Do Than Back Up

If you can think of better ways to spend your time than backing up your hard disk, you need Fastback II. It's the world's fastest and most reliable backup software for the Macintosh. It's also the easiest to use, with simplified file selection, adaptable data compression, advanced error correction and other features to make your backups fast and foolproof.

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UPDATES

To help keep you informed of the current versions of shipping Mac software, Macworld compiled this list. Because at times, keeping track of the latest CPU is tough enough.

DiskTop version 4.0 has increased search capabilities, gives the user more specific control in performing searches, and retails a list of found files for batch operations. Also includes new program and document launcher utility and supports up to 48 volumes. CE Software, 185a Fuller Rd., P.O. Box 65580, West Des Moines, IA 50265; 515/224-1995. Upgrade $30 if purchased before August 1, 1989, $15 if purchased after that date; $99 new.

FileMaker II version 1.1 offers networking support across zones; lets the user mask passwords; fixes problems with indexing duplicate records; fixes some problems with sliding objects containing picture fields and with printing summary reports. Claris, 440 Clyde Ave., Mountain View, CA 94043, 408/987-7000. Upgrade free for registered owners of FileMaker II; $50 for owners of earlier version of FileMaker; $299 new.

Wingz version 1.1 includes expanded custom number formats; uses contour line projections for surface graphs. New documentation includes 525-page volume on the HyperScript language. Informix, 16011 College Blvd., Lenexa, KS 66219; 913/599-7100. Upgrade free for registered owners; $399 new.

PRODUCT COMPARISON

Product	V.	Req.	Rev.	Price
1st Aid Kit	2.8	512KE/3.0		*
4th Dimension	2.0	1MB/6.02	3/90	*
Aatrix CheckWriter II	2.01	512K/4.1		$10
Aatrix TimeCard	2.0	512K/4.2		Free
Accountant Inc.	2.1	1MB/6.02		$9.50
AccuText	1.1	4MB/6.02		*
AdWriter	2.0	1MB/6.0		Free
Alchemy	1.1	1MB/6.0	1/89	$25
Aldus FreeHand	2.0	1MB/6.03	6/89	*
Aldus PageMaker	2.02	1MB/4.1		*
Aldus Persuasion	2.0	1MB/6.0	6/89	*
AmPack Plus	4.2.2	512K/3.2	1/90	$29.95
Analog Connection WorkBench	3.0	1MB/5.0		$50
Anatool	3.1	512K/3.0	7/89	$35
AntiToxin	1.2	512KE/4.2	2/90	Free
APL 68000	7.0	512K/3.2		*
AppleShare File Server	2.0	512K/3.2		*
Archie	2.0	1MB/6.0		$75
ArchiText	2.0	1MB/6.02	7/89	Free
Aristotle's Politics	2.0	2MB/6.03		Free
The Art Importer	2.0	1MB/6.0	8/89	$20
ArtRoom	3.0	512K/3.2		$199
AutoCalc	2.0	1MB/6.0		$95
Aztec C	3.6	512KE/4.2		*
Back to Basics Professional	2.0	512K/3.2		$75
Ball & Stick	2.2	1MB/6.0		Free
Bolt	2.0	1MB/6.03		$29
Bridge	6.0	512K/3.2		$17
Business FileVision	1.5	1MB/6.02		*
Business Sense	1.2	1MB/6.0		*
Business Session	3.2	512K/3.2		Free
CA-Cricket Presents	2.0	1MB/6.0		Free
Calculator Construction Set	2.05	512K/3.2		$25
Canvas	2.1	1MB/6.0	4/89	Free
Capture	2.0	1MB/6.0	2/90	$15
ChromaScan	1.1	4MB/6.02		Free
Colorset	1.2	1MB/6.0		Free
Comment	2.02	1MB/6.0	2/89	*
Commtact	2.0	1MB/6.0		Free
CompileIt	1.2	1MB/6.02		Free
CompuServe Navigator	2.1	512K/3.2		*
Control	1.5	1MB/4.1		Free
Cue	3.0	1MB/6.03		*
DataDesk	3.0	512K/4.02		$125
DataMerge	2.0	512K/3.2		Free
Deluxe Music Construction Set	2.5	512K/6.02	9/89	*
D.E.S	4.0	1MB/6.0		*
Design Dimensions	2.15	5MB/6.03		Free
DeskPaint	2.1C	512KE/4.2		Free
DiagramMaker	1.1	1MB/6.02		*
Digital Darkroom	1.1	1MB/6.02	2/89	Free
DiskFit, Network DiskFit	1.5	512K/4.1		*
DiskTop	4.0	1MB/6.0		*
Display AdBuilder	1.1	1MB/6.03		*
Dollars and Sense	4.1	512KE/3.2		*
DragonWave	1.1	1MB/6.03		*
Empower	2.05	1MB/5.0	6/89	Free
EndLink	1.1	512K/3.2		Free
EndNote	1.2	512KE/3.2	6/89	Free
Extender GrafPak	3.0	1MB/6.02		$30
Falcon	2.1	1MB/3.2		Free
Fastback II	2.1	512KE/4.1	12/89	$25
Fast Forms	1.2	512K/3.2		$25
Ferrari Grand Prix	1.6	512K/3.2		$10
FileMaker II	1.1	1MB/4.2		*
Finale	1.2	1MB/6.02		Free
Financiel Analysis	3.0	512K/3.0		*
Findswell	2.0	512KE/3.2	3/90	*
Fontographer	3.0	1MB/6.0		*
FontShare	2.0	1MB/6.0		Free
FoxBase+/Mac	2.10	1MB/6.0		$75
Freedom of Press	2.2	1MB/6.0		Free
FreeFlow	3.0	1MB/6.03		Free
Full Impact	1.1	1MB/6.0		Free
FullWrite Professional	1.1	2MB/6.02		Free
Gofer	2.01	1MB/4.1		$25
Grafpoint	2.0	2MB/6.0		*
Help DA	3.0	1MB/6.0		Free
HFS Backup	3.0	512K/3.2	8/89	$35
Hybase	1.1	1MB/6.0		Free
HydroMac	2.0	1MB/6.0		*
HyperAnimator	1.5	1MB/6.03	6/89	$29.95
HyperCard	1.2.2	1MB/6.03		$10
HyperDA	1.2	512K/3.2		$10
HyperEngine Developer's Tool	1.1	1MB/6.03		Free
HyperLibrary	2.0	1MB/5.0		*

Bold = *first time the product is being listed*

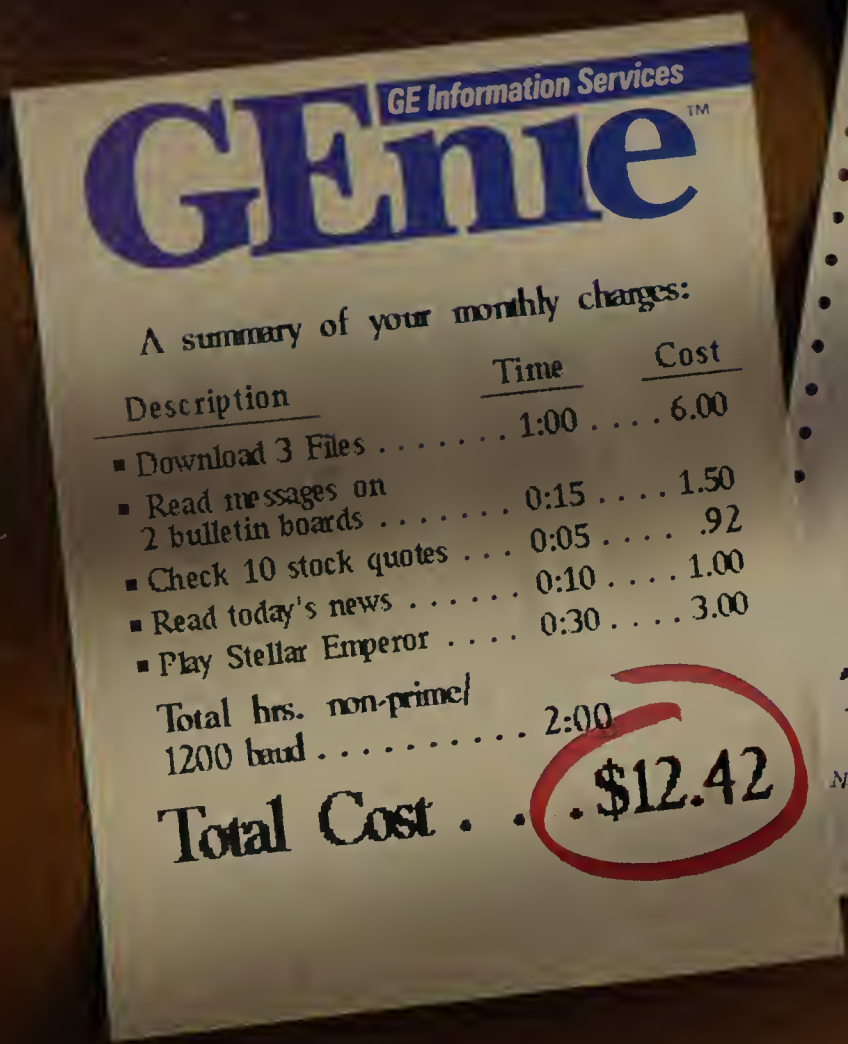
* = *no update*

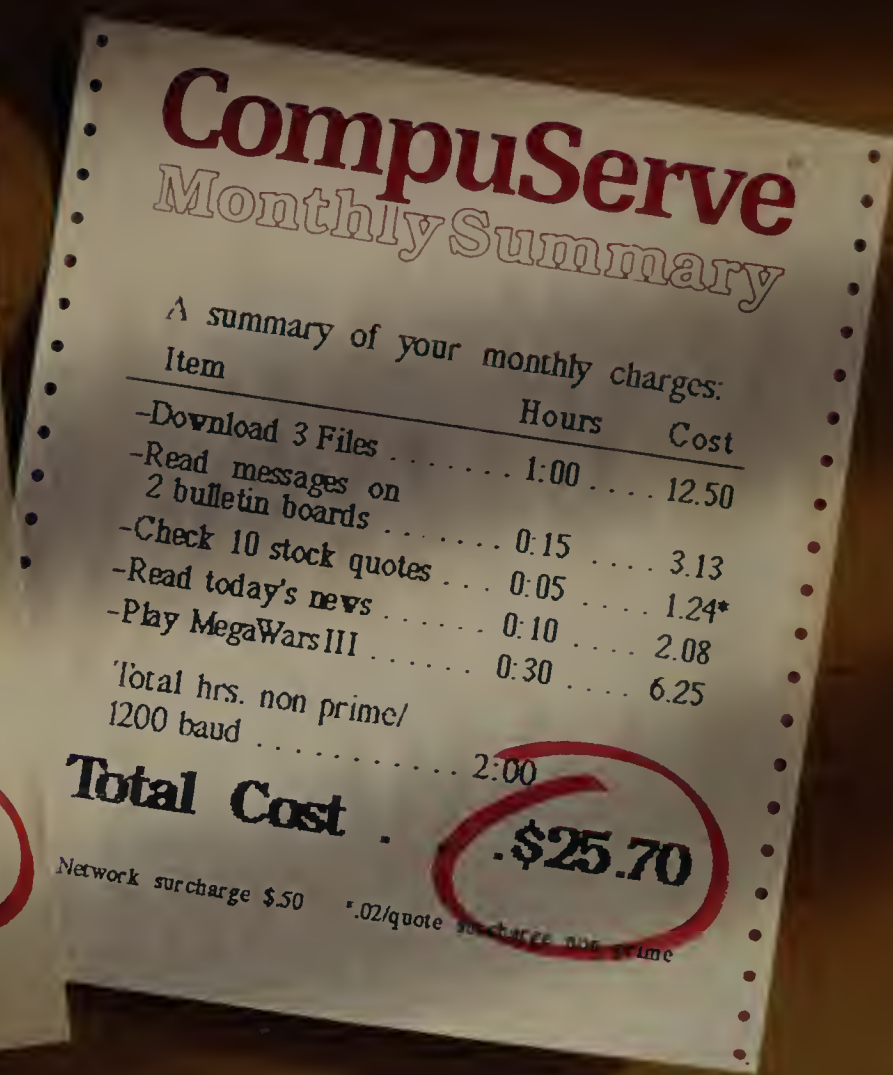
Req. = *min. RAM and system software required*

Rev. = *last time (in past year) reviewed this or an earlier version*

Price = *cost for update to registered owners*

* = *contact your dealer for update policy*





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The difference between the GEnie™ service and CompuServe® could make a big difference to you. Here's why. GEnie's rate for 1200 baud access is just $6 per non-prime hour.* Theirs is more than twice as much. Which means GEnie lets you stay online longer for lots less.

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(1) Set your modem for local echo (half duplex), 300 or 1200 baud.
(2) Dial 1-800-638-8369. When connected, you just enter HHH.
(3) At the U#=prompt simply enter **XTX99593, GEnie.** Then just press RETURN. And have a major credit card or your checking account number ready. For information in the U.S. or Canada, call 1-800-638-9636. Or write GE Information Services, 401 N. Washington, Rockville, MD 20850.

We bring good things to life.

Applies only in U.S. Mon.-Fri. 6PM-8AM local time and all day Sat., Sun., and nat'l holidays. Subject to service availability. Some services may be subject to a surcharge.

Circle 359 on reader service card

PRODUCT COMPARISON

Product	V.	Req.	Rev.	Price
HyperPort Chess	2.0	1MB/6.0		$10
HyperWindows	1.1	1MB/6.02		Free
Icon-It	1.2	1MB/6.0		*
Iconia	7.0	1MB/6.0		*
Igor	1.1	1MB/6.0		Free
ImageStudio	2.0	1MB/6.0		Free
ImageWriter LQ Print Driver	2.0	512K/3.2		Free
In CAD	2.0	2MB/6.0		*
InfoLogic Envelope	6.0	512KE/4.0		$5
Insight Expert Accounts Payable	2.2	1MB/6.0		*
Insight Expert Accounts Receivable	2.2	1MB/6.02		*
Inspiration	2.0	1MB/4.2		Free
Instant-Expert Plus	3.0	1MB/5.0		Free
JetLink Express	1.01	1MB/6.0		Free
KidsTime	1.2	512K/3.2		$15
KiwiEnvelopes	3.0	512KE/4.1		$10
Language Systems Fortran Compiler	1.2	1MB/6.03		*
LapLink Mac	2.0	512K/2.0		Free
LaserPaint Color II	1.02	1MB/6.03		Free
LetrTuck +	2.0	512K/3.2		$20
Lookup	2.0	1MB/6.0		*
Mac86	2.0	1MB/6.02		$10
Mac286	2.0	1MB/6.02		$10
Mac3270	2.0	1MB/6.03		*
MacArchitrion	4.0	2MB/6.03		Free
MacAtlas Paint	2.0	512K/3.2		$35
MacClint	1.1	1MB/5.0		Free
MacConcept	3.0	1MB/6.03		*
MacDesigner	2.0	1MB/3.2		$297
MacDraw II	1.1	1MB/6.0		*
MacEnvelope	4.1	512K/3.2		*
MacFalcon	2.1	1MB/6.03		*
MacFlow	3.0	1MB/6.03		$30
MacFortran	2.4	512K/4.2	3/89	*
MacFortran/020	2.4	512K/4.2	3/89	*
MacFortran for MPW	1.1	2MB/6.02		Free
MacHerbal	2.0	512K/3.2		$49
MacHotel	3.3	1MB/6.03		Free
MacLine	3.0	512K/3.0		$25
MacLinkPlus Wang VS	4.0	512KE/3.2		$45
MacMainFrame 3270/CUT	2.1	2.5MB/6.02		$100
MacPhonebook	2.0	512KE/3.2	1/90	*
MacPrint	1.1	1MB/6.02		Free

Product	V.	Req.	Rev.	Price
MacProject II	2.0	1MB/6.0	8/89	*
MacProof	3.2.1	1MB/6.02	2/90	$30
MacRecorder	2.0	512K/3.2	12/89	*
MacSchedulle	2.0	1MB/6.0		$30
MacSmarts	3.0	1MB/6.0		*
MacTell	3.5	512K/3.0		*
MacTerminal	2.31	512K/3.2		Free
MacVision	3.0	1MB/6.0	7/89	$79.95
MacWrite II	1.1	1MB/6.0		Free
Managing Your Money	2.0	512K/6.03		$49.95
MapGrafix	2.0	4MB/6.03		Free
MarketMaster	II +	1MB/6.03		$25
Master Tracks Pro	4.0	1MB/4.1		$45
MathType	2.0	512K/6.02	11/89	*
Matlab	1.2	1MB/3.0		*
MaxPage	1.2	512K/3.2		Free
McMax	2.0	1MB/5.0	8/89	*
Memorybank Manager	3.0	1MB/6.0		Free
MGMStation	2.5	512KE/3.0	4/89	*
Microsoft File	4.0	512K/3.2	4/89	*
Microsoft Mail	2.0	1MB/6.02	1/90	*
Microsoft Word	4.0	512KE/3.2	10/89	*
Microsoft Works	1.2	512K/6.0	4/89	*
MindWrite	2.1	512KE/4.2		*
MiniCad +	2.0	1MB/6.0	11/89	*
MiniDraw	4.0	512KE/4.2		$17
MockPackage Plus Utilities	4.4	512KE/3.2		$15
Modern Artist	2.0	2MB/6.02		$150
Monte Carlo	2.0	1MB/6.03		$60
More II	2.01	1MB/4.1	6/89	Free
MSFL: Pro League Football	2.0	1MB/6.0		*
MultiLedger	1.1	512K/3.2		Free
Multi-User Appointment Diaries	3.01	512K/3.2		*
Music Publisher	2.0.3	1MB/6.0		Free
MyTimeManager	2.0	1MB/6.0		*
Navigate	2.0	1MB/6.0		Free
Nemesis Go Master	4.0	512K/4.1	6/89	*
The NightWatch	1.03	512KE/3.2		*
Nisus	2.0	1MB/6.02	9/89	Free
NuPaint	1.04	512K/3.2	5/89	Free
Nutrition Stack	2.0	1MB/6.02		$20
OmniPage	2.0	4MB/6.02	2/90	$150
Omnis 3 Plus Express	2.0	512KE/3.2		*
On Schedule	2.0	1MB/3.0		*

Circle 354 on reader service card.

Take This Simple Network Test.

1. Which Network Doesn't Tie Up A Valuable Macintosh As A File Server?

☐ AppleShare ☐ TOPS
☐ DaynaNET

Hint: AppleShare® requires a dedicated Macintosh® as a file server. DaynaNET™ runs on an inexpensive yet fast IBM® compatible 286 or 386 personal computer. Distributed networks such as TOPS® don't require a dedicated file server, but steal processing power from every Macintosh on the network.

2. Does A Real Network Need A Dedicated File Server Anyway?

☐ Yes ☐ No

Hint: A file server provides centralized storage and management of information and a basis for running multiuser applications. Dedicating the file server improves the network's performance, reliability, and security. Even small networks can benefit from a dedicated file server.

3. Which Network Operating System Is The Fastest?

☐ AppleShare
☐ DaynaNET
☐ TOPS

Hint: Both TOPS and AppleShare run on top of the Macintosh or MS-DOS® operating system. This slows them down. The DaynaNET operating system directly controls the file server, taking full advantage of all its speed and processing power.

4. Which Network Will You Never Outgrow?

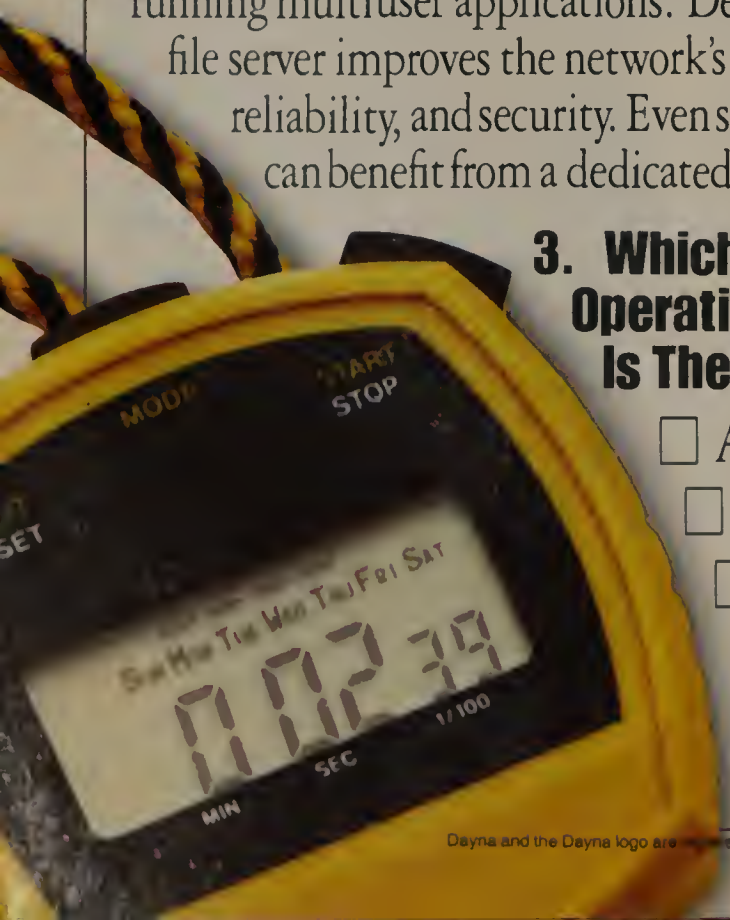
☐ AppleShare ☐ DaynaNET ☐ TOPS

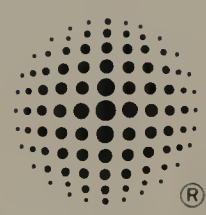
Hint: You soon outgrow a distributed network such as TOPS, because its performance deteriorates as you add users. Adding to an AppleShare network requires additional costly Macintosh file servers, so you soon outgrow your budget. DaynaNET's generous upgrade program lets your network grow as you grow in affordable stages.

Model Number	Software Supports	Retail Price
DaynaNET/4L	4 users on LocalTalk	$795
DaynaNET/8L	8 users on LocalTalk	$1795
DaynaNET/8LE	8 users on LocalTalk and Ethernet	$2195
DaynaNET/XL	100 users on LocalTalk	$3595
DaynaNET/XLE	100 users on LocalTalk and Ethernet	$3995

Prices include the DaynaNET operating system software and one DaynaTALK PC network interface card for the file server. All models of DaynaNET can be upgraded, and we apply a generous credit for the model you currently own against the price of the upgrade.

Buy DaynaNET before March 31 and get a free DaynaTALK™ for Macintosh 5-Pack.





Dayna®

50 South Main Street, Suite 530, Salt Lake City, Utah 84144, 801 531-0203

Answers:

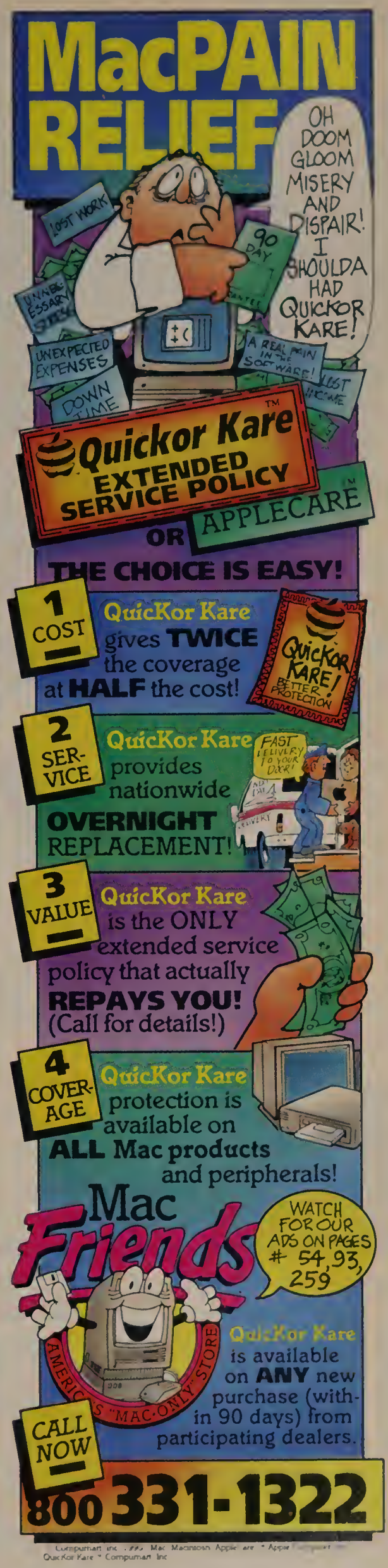
1. DaynaNET. It's like getting a Macintosh free. 2. Yes. Unless you're using your network just for printing, and don't mind waiting. 3. DaynaNET. In fact, DaynaNET is a unique version of NetWare, the leading high performance network system in use today. 4. You guessed it. DaynaNET. And for even more growth, DaynaNET networks can be connected together, as well as to networks running NetWare.

Dayna and the Dayna logo are registered trademarks of Dayna Communications, Inc. All other product names are trademarks of their respective holders. DaynaNET is a unique version of NetWare

Circle 232 on reader service card

PRODUCT COMPARISON

Product	V.	Req.	Rev.	Price
P51 Mustang Flight Simulator	2.04	512K/3.2	4/89	$10
PacerLink	5.0	512K/5.0		•
Panorama	1.1	1MB/4.2	5/89	Free
PEGASYS II	3.2	1MB/6.03		Free
Performer Sequencer	3.2	1MB/6.0		Free
Personal Golf Stats	2.0	512K/3.2	2/90	Free
Personal Reference Catalog	2.0	1MB/6.0		$10
PICT Detective	2.0	512KE/6.0		$20
PixelPaint	1.2	2MB/4.1		Free
Plains & Simple	1.06	1MB/3.2		•
PowerDraw	3.0	1MB/6.0		•
PowerStation	2.5.2	512K/4.1		Free
PowerTools	3.0	4MB/6.0		•
Practica Musica	2.1	512K/3.2		$10
Printer Interface III	2.0	512K/6.02		$22.50
Pro Crte	1.3	512K/4.1		•
Professional Composer	2.3	1MB/6.03		Free
Professional Image II	2.0	1MB/6.0		$22
PropsForms	2.0	1MB/6.03		Free
Prototyper	2.01	1MB/4.1	9/89	$79
Publish or Perish	3.0	512KE/3.2		$10
Pyro	3.31	512K/4.1		$10
QuarkXPress	2.1	1MB/6.02	1/89	•
Quicken	1.5	512K/3.2	1/90	•
QuickLetter	1.01	512KE/3.2	10/89	Free
QuickMail	2.0	512KE/3.2		•
QuickShare	2.0	512KE/3.2		$75
QuickShot ★	2.1	1MB/4.2		$5
Read-It OCR	2.1	1MB/6.03	12/89	•
Reports	1.2	1MB/6.0		Free
Retail Engine	3.0	1MB/6.0		•
Sales Associate	1.10	1MB/6.03		Free
SAM	1.1	512KE/3.2	12/89	•
ScheduleMaker	3.0	1MB/6.0		$25
ScreenSnap ★	2.2	1MB/4.2		•
ScriptEdit	1.1	1MB/6.04		•
Sentinel	2.0	512K/4.1		$20
Shanghai	2.0	1MB/6.02	2/90	$13
SimpleSpan	2.5	512K/3.2		•
Smart Alarms	2.9.1	512K/3.2		$12
SmartForm Assistant	1.1	1MB/6.0	7/89	Free
SmartForm Designer	1.1	1MB/6.0	7/89	Free
SmartScrap & The Clipper	2.0	1MB/6.03	8/89	$20
Snap	3.1	1MB/3.0	9/89	•
SoftPC Mac	1.3	2MB/6.0		•
Sound Designer Universal	1.5	512K/6.03		$45
Spellswell	2.1	512K/3.2	3/90	•
Springboard Publisher	2.0	1MB/6.0	3/89	•
Stepping Out II	2.0	1MB/4.1	4/89	Free
StickyBusiness	1.06	512KE/6.03		Free
Still Light	3.0	1MB/6.0		Free
StrataVision 3d	1.02	2MB/6.03		Free
Suitcase II	3.0	512KE/4.1	10/89	$25
Super 3d	2.0	512KE/6.02	10/89	$200
SuperGlue II with GlueNotes	2.1	1MB/6.0	1/90	•
SuperLeserSpool	2.0	512K/4.1		$20
SuperPaint	2.0	1MB/6.02	8/89	$50
SuperSpool	5.0	512K/4.1		$20
Synchronicity	2.0	512KE/3.2	12/89	$5.00
Systat	3.2	1MB/6.0	2/89	$75
Teacher's Rollbook	2.2	512K/3.2		$17.95
Ternary Plot	3.0	512K/3.2		•
TextPert	3.01	1MB/6.0		Free
Think C	4.0	1MB/5.0	2/90	•
Timbuktu	3.0	1MB/4.1		Free
TimeMinder	2.0	1MB/4.2	9/89	$50
Timeslips III	1.2	512KE/4.2	2/90	$50
TML Pascal II	3.0	1MB/5.0	6/89	$79.95
TMON	2.8.1	512K/4.0		•
TOPS/Mac	2.1	512K/3.2		•
Trapeze	2.1	1MB/6.0		$35
TrueBASIC	2.02	1MB/6.0		Free
TrueForm	1.1	1MB/6.2		Free
Turbosynth	2.0	1MB/6.03	1/89	$35
UNITize	1.3	512KE/3.2	10/89	$20
VersaCAD/ Macintosh Edition	2.11	1MB/6.0		Free
Virex	2.2	1MB/4.2	1/90	•
Virtual	2.0	1MB/3.2	10/89	Free
VMacS	2.0	1MB/6.0		$25
Wall Street Investor	3.0	1MB/5.0		$150
Wingz	1.1	1MB/6.0	6/89	Free
Word Finder	2.0	512K/3.2		•
WordPerfect for the Macintosh	1.0.3	1MB/4.2		Free
WorksPlus Spell	2.0	1MB/6.03	1/90	•
WriteNow	2.0	512K/3.2	5/89	•



Circle 109 on reader service card.

Abaton helps Tom Zimberoff spend a lot more time in the dark.

For Tom Zimberoff, finding time to take pictures isn't easy. He's in demand. As one of the premier portrait photographers in the world, he's shot everyone from John Sculley to John Lennon, Groucho Marx to Jimmy Swaggart. He's shot for Time, SPY, People, GQ, Fortune, and a variety of advertising agencies.

Which means he doesn't have a whole lot of time to meet with art directors, editors, or clients. "But now I spend more time behind the camera, thanks to Abaton."

"With the Abaton Interfax, I can exchange faxes with art directors and editors all over the world." Tom checks out a fax of the layout and finds out what his client wants. Then he faxes his estimate to them directly from his Mac, and avoid "an hour's drive or a four-hour flight for a 15-minute meeting."

Tom also uses an Abaton 8-bit Upgrade in his Apple Scanner to scan Polaroids of each shoot. He stores the images together with information on his assignments. So it's easy for him to look up the details later on. And when it's time to print, Tom uses the Abaton QuickStep printer "because I want my letters to look as good as my photographs."

Tom may not be your typical Abaton user. But the productivity he gets out of his Abaton equipment is typical of Abaton users. An because Abaton helps Tom spend more time in the dark; it's easie for him to get published.

If you'd like to publish — or get published — faster and easier call Abaton at *1-800-444-5321*. We can make your ideas easier to publish.

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Dealers circle 107 on reader service card

End Users circle 131 on reader service card

WHERE TO BUY

This listing provides companies and phone numbers for products mentioned in this issue. Allow several weeks for responses to reader service card inquiries. Asterisks indicate vendors who prefer to be contacted by phone.

Reader Service

- **1stAid Kit** 1stAid Software, Inc.; 617/783-7118, 800/843-3497.

701 **101 Macros Plus for Excel** Individual Software, Inc.; 415/595-8855, 800/331-3313.

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704 **Backmatic** Magic Software, Inc.; 402/291-0670, 800/342-6243.

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724 **EtherLink/SE** 3Com Corp.; 408/562-6400, 800/638-3266.

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Learn from the MacMaestros

The first two days of MACWORLD Expo begin with keynote presentations that are guaranteed to make your spirits soar. The industry's best will dazzle you with the newest Macintosh developments and trends; you'll get the latest scoop straight from the Mac insiders.

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1. The Multimedia Mac (New!) – Sessions to bring you up to date on the exciting integration of video, sound and animation on the computer platform.

2. Designer Solutions (New!) – At last! Intensive sessions to maximize the usefulness of Macintosh in design applications — for architects, graphic artists, engineers and more.

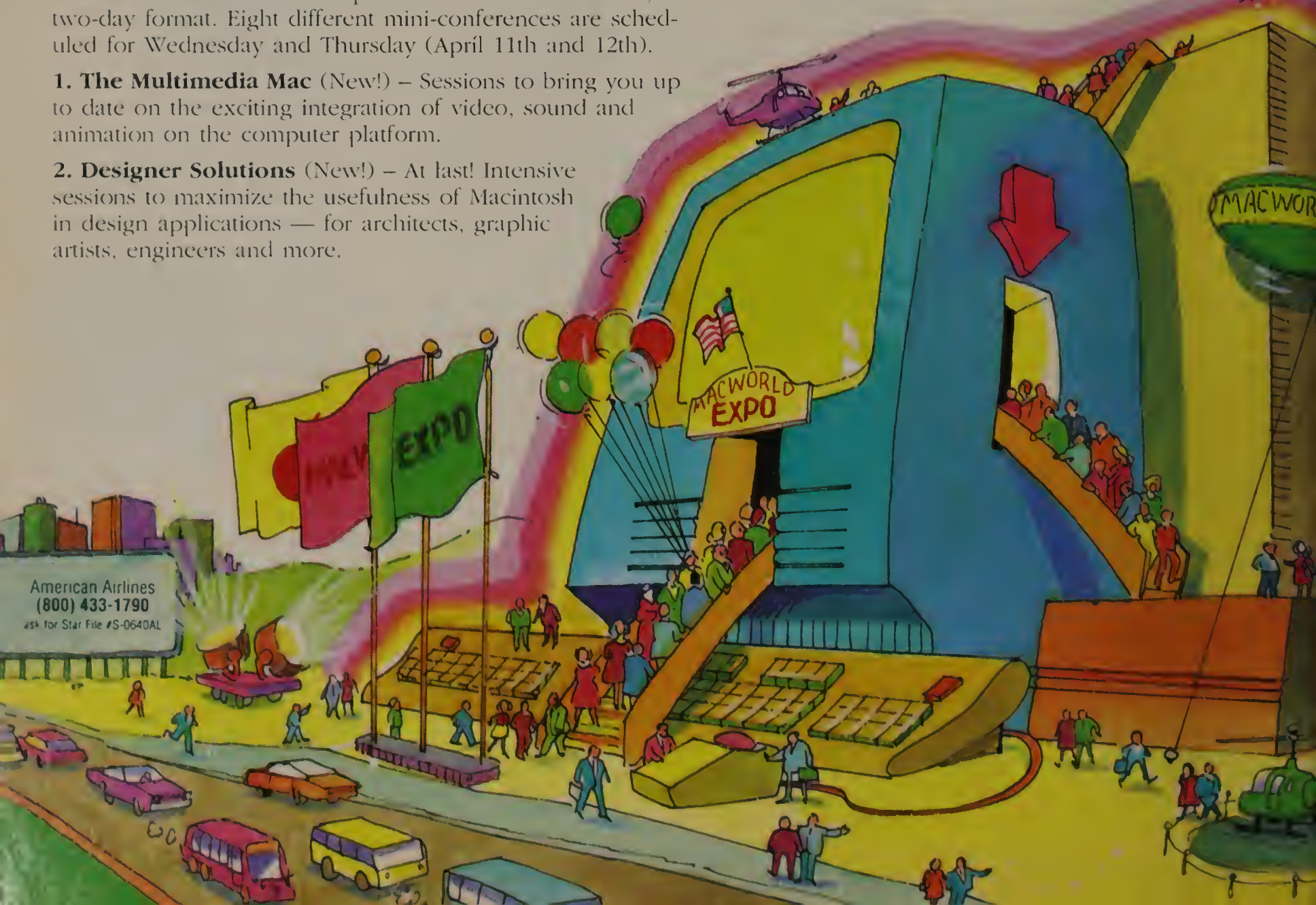
3. Software Review Sessions (New!) – Authoritative, unbiased overviews of the best-selling Macintosh softwa packages, presented by software review editors from the leading Mac publications.

4. User Workshops – Introductory: for those just gettin started with the Mac, or for those who need a quick les on the most popular Mac applications. Advanced: where experienced users share their ideas and expertise and reveal insider tricks.

5. The Mac in Business – No-nonsense pointers to help solve the unique problems of business users, along with discussions on the possible impact of developing trends and technologies in the Mac marketplace.

6. Programmer/Developer Forums – *The* place for veteran and novice techies to brainstorm and learn abou innovative advances and techniques.

7. Special Interest Group Meetings – Sessions to serve the needs of users who are seeking to prosper and prof from the Mac in an amazingly broad range of settings. Includes: Education Workshops — A golden opportunity for teachers and administrators to learn how colleagues using the Mac. How-To's for the Home Office/Small Bus ness – Résources and recommendations especially usefu the Macintosh home office worker, along with tips on growing your own business with a Mac. Other sessions will highlight International Issues, The Mac in Healthcare and The Mac in the Law Office.



MACWORLD EXPOSITION®

San Francisco, April 11, 12 and 13

Register for MACWORLD Expo/San Francisco by March 5 and save $15 on the full Conference Program and Exhibit Package, or $10 on Exhibits only admission.

This is your chance to preregister for MACWORLD Expo/San Francisco, April 11-13, 1990, at Moscone Center, Brooks Hall and Civic Auditorium. Please choose your package and fill out this form completely. Incomplete forms will be returned. **Use one form per person.** (Make photocopies to register additional people.) Then send the completed form(s) along with payment to: MACWORLD Expo, P.O. Box 4010, Dedham, MA 02026.

Special Instructions for Non-U.S. Attendees

If you're preregistering from outside the U.S. and would prefer to have your badge sent to you instead of picking it up at Moscone Center, be sure to check the appropriate box on the registration form and add an additional $35 to your preregistration cost. We will Federal Express your badge to you. Please fill in the exact street address and be sure to include your telephone number. Do not use a Post Office Box.

Registration coupons must be returned by March 5; coupons received after March 5 will be returned. Registration fees are non-refundable. For further information, call the MACWORLD Expo Hotline at (617) 361-3941. U.S. attendees will be mailed their badges on or about March 20. (Be sure to check box indicating where badge should be sent.) All other badges will be held at the Preregistration Counter at Moscone Center for pick up beginning Tuesday, April 10.

*All Conference Sessions are subject to change without notice. Admission is on a first-come, first-served basis, with no guaranteed seating or reservations. Please complete the registration form on the reverse side and send it, along with your check or money order to: MACWORLD Expo, P.O. Box 4010, Dedham, MA 02026

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San Francisco April 11, 12 and 13

Please register me for:

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Conference Sessions and Exhibits*
Preregister by March 5
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❑ **Package Two $15**
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c. ❑ Distributor/dealer/retailer/service
d. ❑ Finance/insurance/real estate
e. ❑ Business services
f. ❑ Professional (law/medicine)
g. ❑ Health services
h. ❑ Communications/publishing
i. ❑ Education
j. ❑ Government
k. ❑ Consultant
l. ❑ Other (specify) _____

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n. ❑ Comptroller/treasurer/accountant
o. ❑ DP/MIS manager
p. ❑ Owner/partner
q. ❑ Engineer
r. ❑ Doctor/lawyer/dentist
s. ❑ Educator
t. ❑ Art director/writer/editor
u. ❑ Consultant
v. ❑ Marketing
w. ❑ Sales
x. ❑ Other (specify) _____

Size of your organization
(number of employees national/international)
y. ❑ Under 50
z. ❑ 50-99
aa. ❑ 100-499
bb. ❑ 500-999
cc. ❑ 1,000-5,000
dd. ❑ Over 5,000

Which personal computer(s) do you own/or use?
ee. ❑ Macintosh
ff. ❑ Macintosh Plus
gg. ❑ Macintosh SE
hh. ❑ Macintosh II
ii. ❑ Apple II Series
jj. ❑ IBM PC (or compatible)
kk. ❑ None
ll. ❑ Other (specify) _____

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MAC

8. Late-Breaking/Popular Demand Topics – To keep the MACWORLD Expo conference program (and you!) up-to-the-minute, we'll top off the agenda with sessions reflecting the latest market developments — and special requests. Included will be the popular MACWORLD Expo User Group (MUSE), where user group members from all over the country exchange information, ideas and strategies, and get good answers to tough questions.

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Your advanced registration must be received by March 5, 1990. Registrations received after March 5 will be returned. On-site registration is cash only. Please note: All conference sessions are subject to change without notice. Admission is on a first-come, first-served basis, with no guaranteed seating or reservations.

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American Airlines is the official airline of MACWORLD Expo, and you can save up to **45%** if you fly to San Francisco on American. To take advantage of the MACWORLD Expo discount, just call American at **(800) 433-1790** and ask for Star File number **S-0640AL.** You'll automatically receive your discount.

Hotels in the San Francisco area are also offering MACWORLD Expo discounts. To receive the preferred rates, simply call one of the hotels listed below and mention that you are going to MACWORLD Expo. There are a limited number of rooms available at preferred rates, so make your plans early! Published rates are single and double rooms respectively and are starting rates:

HOTEL	RATE	PHONE*	HOTEL	RATE	PHONE*
Fairmont Hotel	$125/$155	772-5000	Huntington Hotel on Nob Hill	$145/$145	474-5400
Four Seasons	$155/$155	775-4700	Hyatt Regency	$135/$160	788-1234
Grand Hyatt Union Sq	$149/$149	398-1234	Le Meridien	$135/$155	974-6400
Hilton	$110/$120	771-1400	Marriott	$150/$170	896-1600
Holiday Inn Golden Gateway	$89/$89	441-4000	Parc Fifty Five	$127/$127	392-8000
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			The Westin St. Francis	$115/$130	397-7000

*The area code for San Francisco is (415).

Show Locations and Hours

MACWORLD Expo's three San Francisco locations are Moscone Center, Brooks Hall and Civic Auditorium. MACWORLD Expo Express Buses conveniently connect you with all three locations; just look for the "Expo Express" and hop on!

The MACWORLD Expo/San Francisco show hours are:

Exhibits	Wednesday, April 11	10 a.m. - 6 p.m.
	Thursday, April 12	10 a.m. - 6 p.m.
	Friday, April 13	10 a.m. - 3 p.m.
Conference Program	Wednesday, April 11	10 a.m. - 6 p.m.
	Thursday, April 12	10 a.m. - 6 p.m.
	Friday, April 13	10 a.m. - noon

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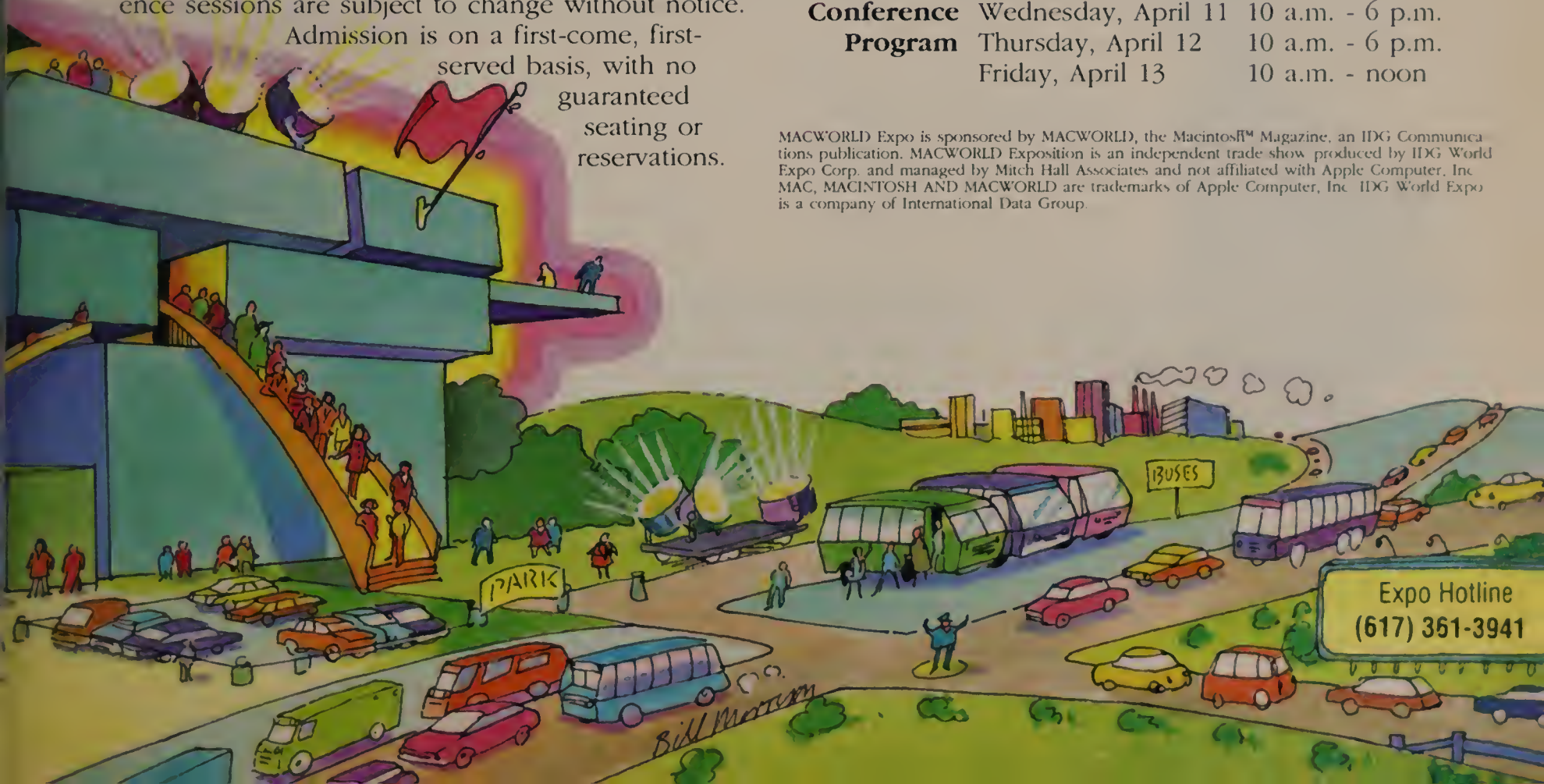

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811 **Wild Things** Language Systems Corp.; 703/478-0181.

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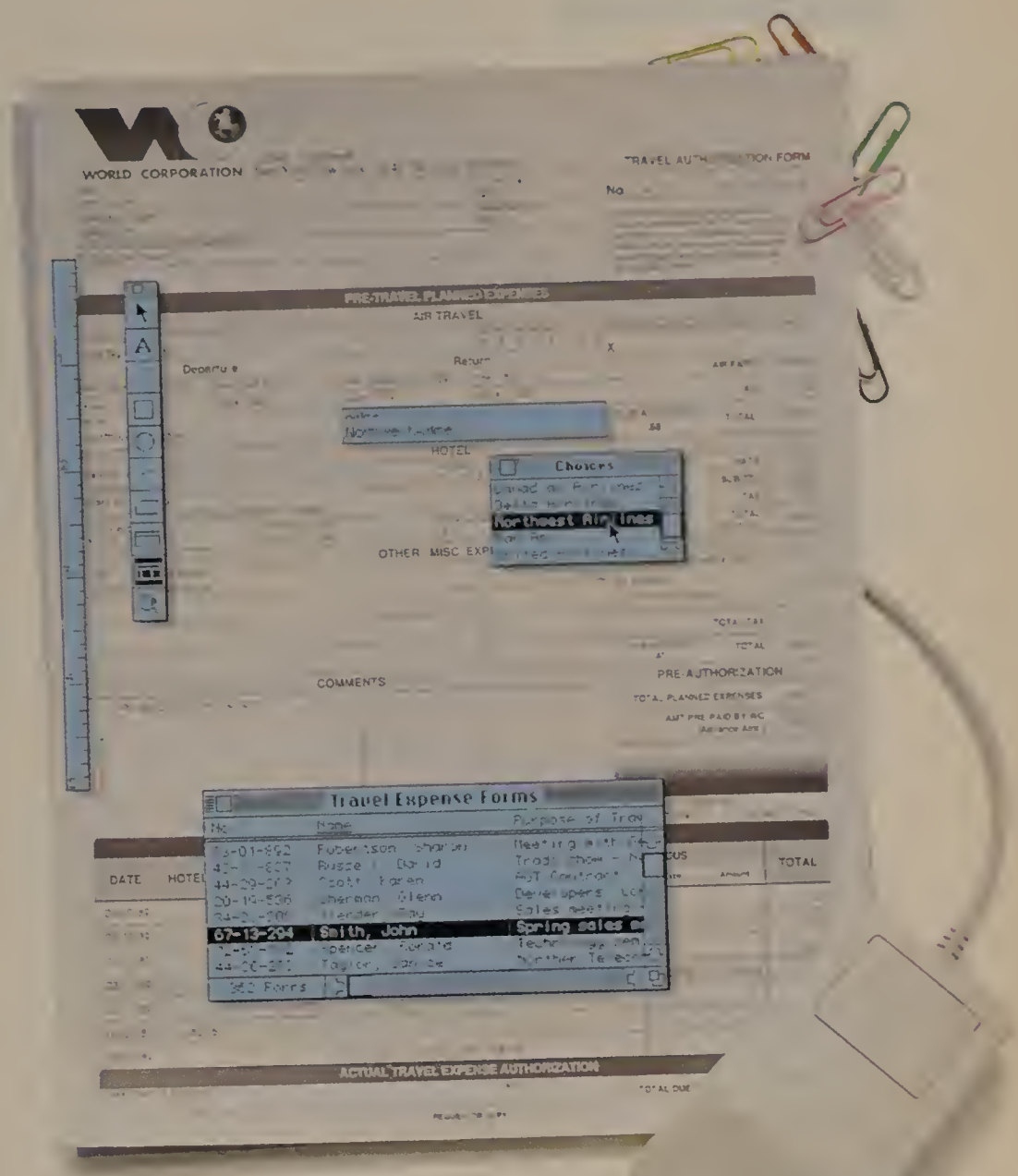

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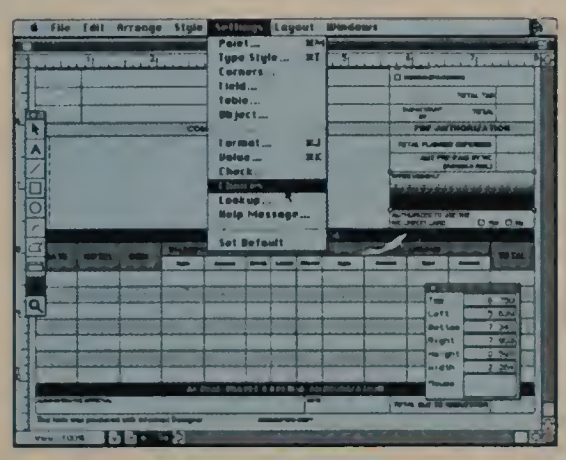

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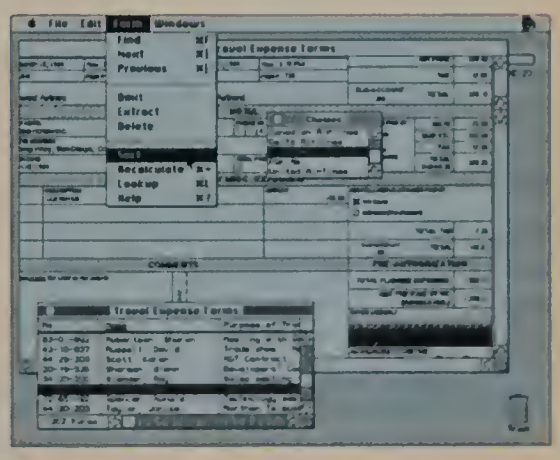

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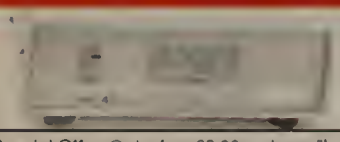

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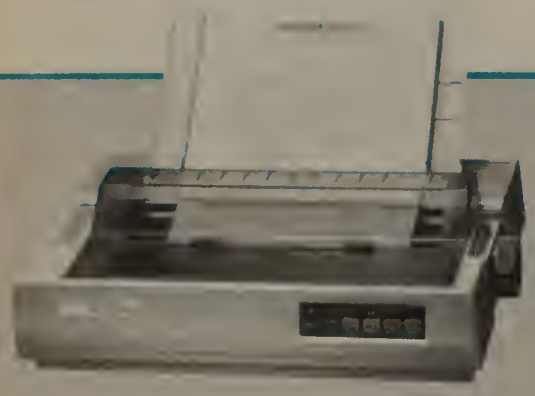

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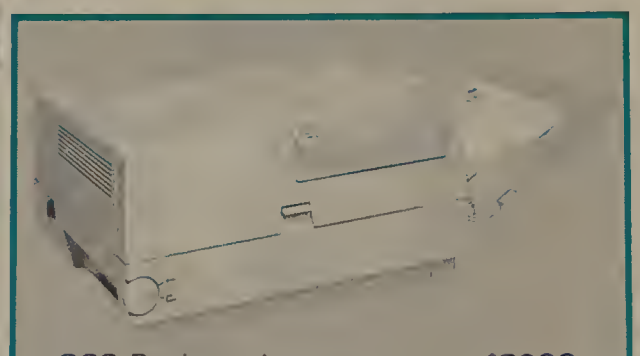

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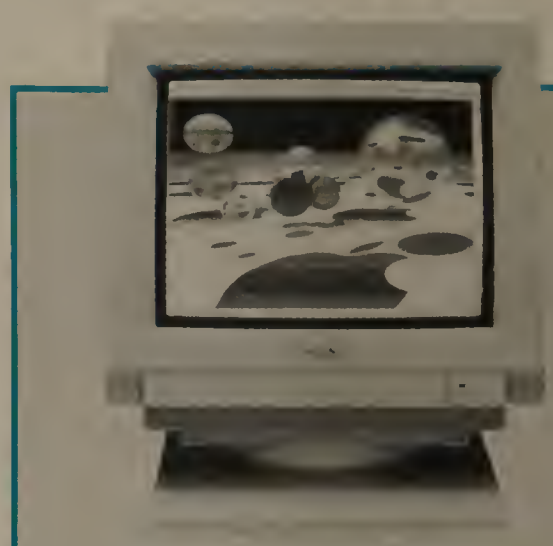

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- MultiSync 3D 736
- Intersect External CD Rom 736
- Clip Art 3D for CD Rom 266

NEMONIX
- 68020 16Mhz SE Accelerator 378
- Co-Processor 182

ORCHID TECHNOLOGY
- MacSprint II 239
- MacFax/Modem 9600 Baud 439

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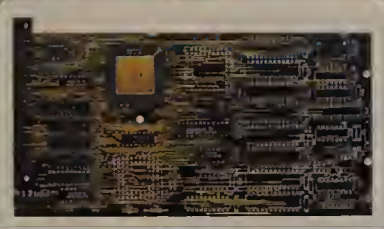

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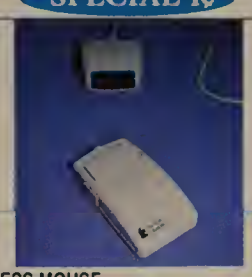

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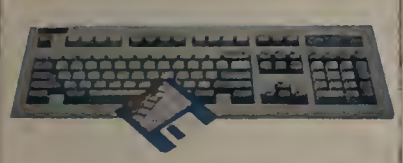

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Seagate 46 *40ms*	~~$899.~~	**$489**
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***POWER**Drive* 60 *28ms*	~~$899.~~	**$539.**
Seagate 62 *28ms*	~~$999.~~	**$579.**
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CMS Enhancement 81 *28ms*	~~$1,299.~~	**$779.**
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Seagate 81 *28ms*	~~$1,199.~~	**$599.**
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Caché Systems 150/150 Tape *16ms*	~~$3,299.~~	**$2,159.**
CMS Enhancements 170 *18ms*	~~$3,195.~~	**$1,549.**
Imprimis-MacWren 170 *16ms*	~~$2,599.~~	**$1,499.**
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CMS Enhancements PD 600 *16ms*	~~$5,845.~~	**$3,499.**
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Seagate 62 *28ms*	~~$999.~~	**$539.**
80 Megabyte		
Quantum 80 *19ms* (2 Year Warranty!)	~~$1,299.~~	**$679.**
100-170 Megabyte		
Quantum 105 *19ms* (2 Year Warranty!)	~~$1,899.~~	**$749.**
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40 Megabyte		
Caché Systems 45 *28ms*	~~$599.~~	**$449.**
CMS Enhancements Pro 45 *32ms*	~~$569.~~	**$469.**
Quantum 40 *19ms* (2 Year Warranty!)	~~$899.~~	**$449.**
Seagate 46 *40ms*	~~$799.~~	**$399.**
60 Megabyte		
Caché Systems 60 *28ms*	~~$639.~~	**$499.**
CMS Enhancements Pro 60 *40ms*	~~$649.~~	**$579.**
Seagate 62 *28ms*	~~$649.~~	**$475.**
80 Megabyte		
Caché Systems 80 *28ms*	~~$729.~~	**$575.**
CMS Enhancements Pro 80 *28ms*	~~$749.~~	**$669.**
Quantum 80 *19ms* (2 Year Warranty!)	~~$1,299.~~	**$679.**
Seagate 81 *28ms*	~~$749.~~	**$549.**
100-170 Megabyte		
Caché Systems 150 *16ms*	~~$1,429.~~	**$1,199.**
CMS Enhancements PI 170 *16ms*	~~$1,699.~~	**$1,499.**
Imprimis-MacWren 170 *16ms*	~~$2,499.~~	**$1,399.**
Quantum 105 *19ms* (2 Year Warranty!)	~~$1,899.~~	**$749.**
Quantum 120 *15ms* (2 Year Warranty!)	~~$2,399.~~	**$999.**
Quantum 170 *15ms* (2 Year Warranty!)	~~$2,899.~~	**$1,149.**
Toshiba 105 *25ms*	~~$1,499.~~	**$699.**
300-600 Megabyte		
CMS Enhancements PI 300 *16ms*	~~$4,395.~~	**$2,195.**
Imprimis - MacWren 300 *16ms*	~~$4,395.~~	**$1,999.**
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Caché 150 Tape	~~$1,399.~~	$799.
CMS Enhancements 60	~~$995.~~	$649.
CMS Enhancements 150	~~$1,445.~~	$849.
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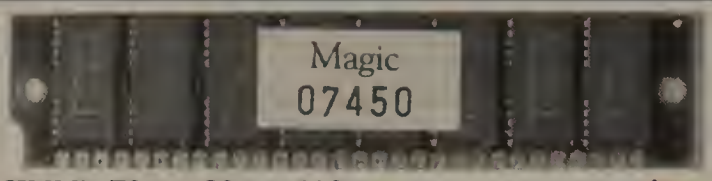

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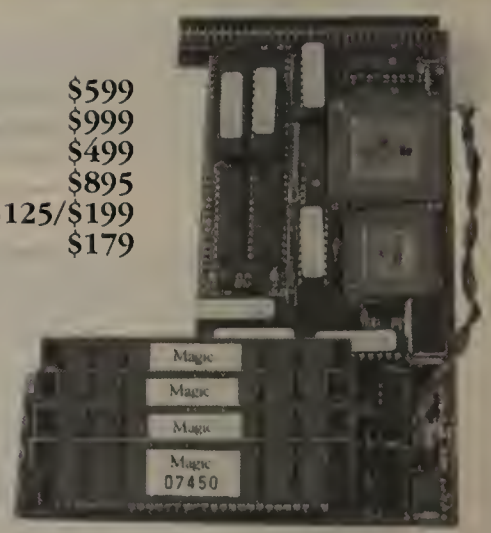

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The Macworld Catalog.

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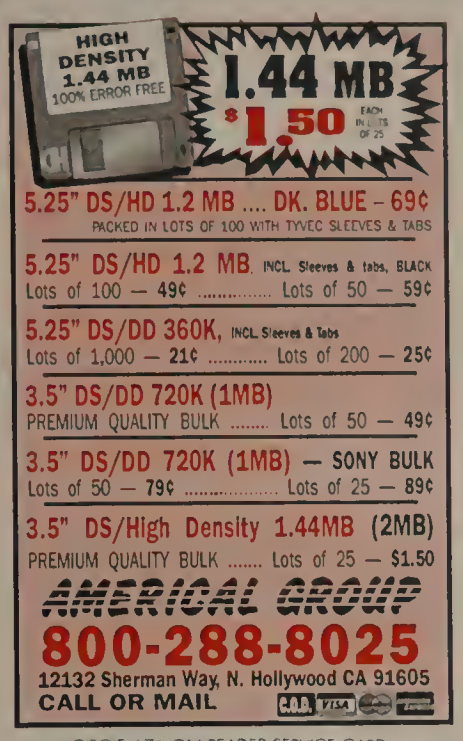

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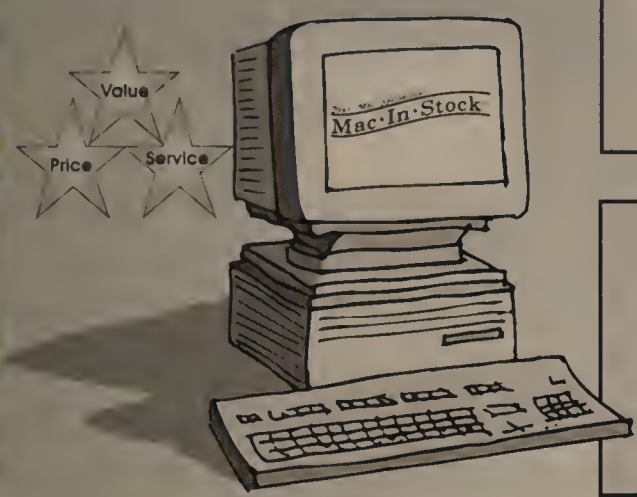

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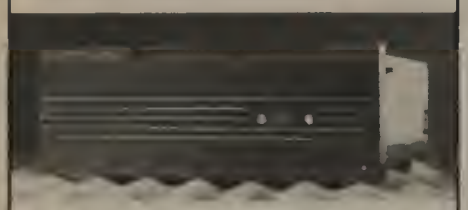

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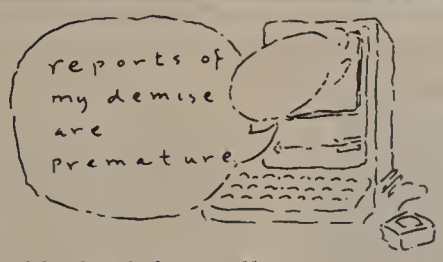

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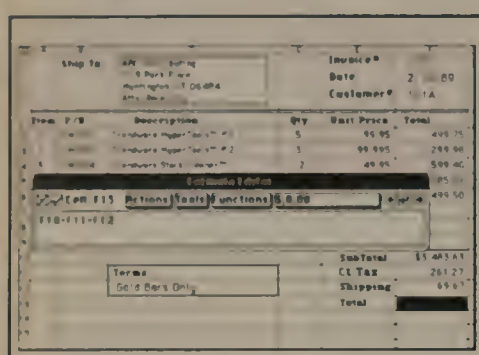

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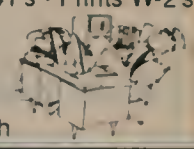
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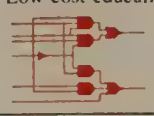

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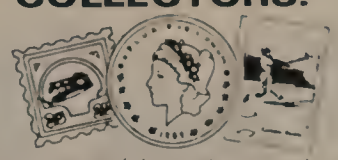

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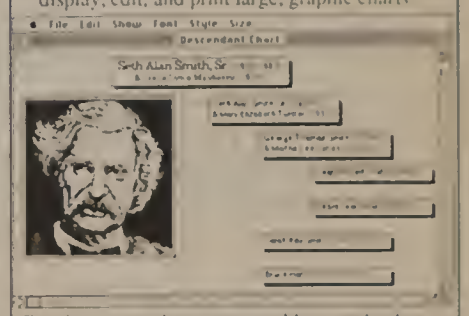

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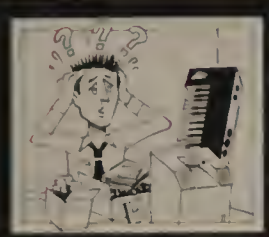

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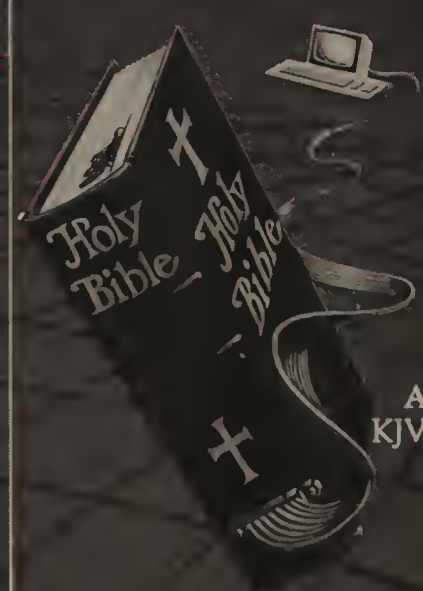

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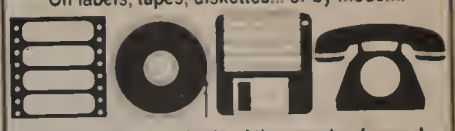

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49	1	3	**Microsoft Excel**	Microsoft
45	4	4	**Aldus PageMaker**	Aldus
34	5	5	**MacWrite**	Claris
18	6	6	**WordPerfect for the Macintosh**	WordPerfect
46	8	7	**MacDraw**	Claris
14	9	8	**Adobe Illustrator 88**	Adobe
13	7	9	**QuarkXPress**	Quark
4	10	10	**Wingz**	Informix

EDUCATION SOFTWARE

Months on chart	Last month	This month		
12	1	1	**Where in the World Is Carmen Sandiego?**	Brøderbund
25	3	2	**Reader Rabbit**	The Learning Company
41	2	3	**Math Blaster**	Davidson & Associates
4	4	4	**Math Rabbit**	The Learning Company
36	—	5	**Typing Tutor IV**	Simon & Schuster Computer Software

ENTERTAINMENT SOFTWARE

Months on chart	Last month	This month		
3	—	1	**SimCity**	Maxis Software
41	3	2	**MacGolf**	XOR/PCAI
37	2	3	**Dark Castle**	Silicon Beach Software
1	—	4	**Tetris**	Spectrum HoloByte
39	1	5	**Flight Simulator**	Microsoft

NETWORK/DATA COMMUNICATIONS

Months on chart	Last month	This month		
37	1	1	**TOPS**	TOPS
33	2	2	**AppleShare**	Apple Computer
40	3	3	**LocalTalk**	Apple Computer
25	4	4	**PhoneNet**	Farallon Computing
6	—	5	**Red Ryder**	FreeSoft

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Months on chart	Last month	This month		
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17	—	3	**FX20**	GCC Technologies
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6	—	5	**Rodime 45 Plus**	Rodime

ADD-IN BOARDS/MEMORY

Months on chart	Last month	This month		
15	3	1	**Radius Interface Display**	Radius
23	1	2	**Apple 1MB Memory Expansion Kit**	Apple Computer
27	2	3	**Radius Accelerator**	Radius
4	—	4	**Memory Expansion Kit**	Microtech International
1	—	5	**RAM Plus**	MacPeak Systems

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After Dark *Berkeley Systems* Screen saver

Audiomedia *Digidesign* CD-quality audio board

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Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors. Covers sales during November 1989.

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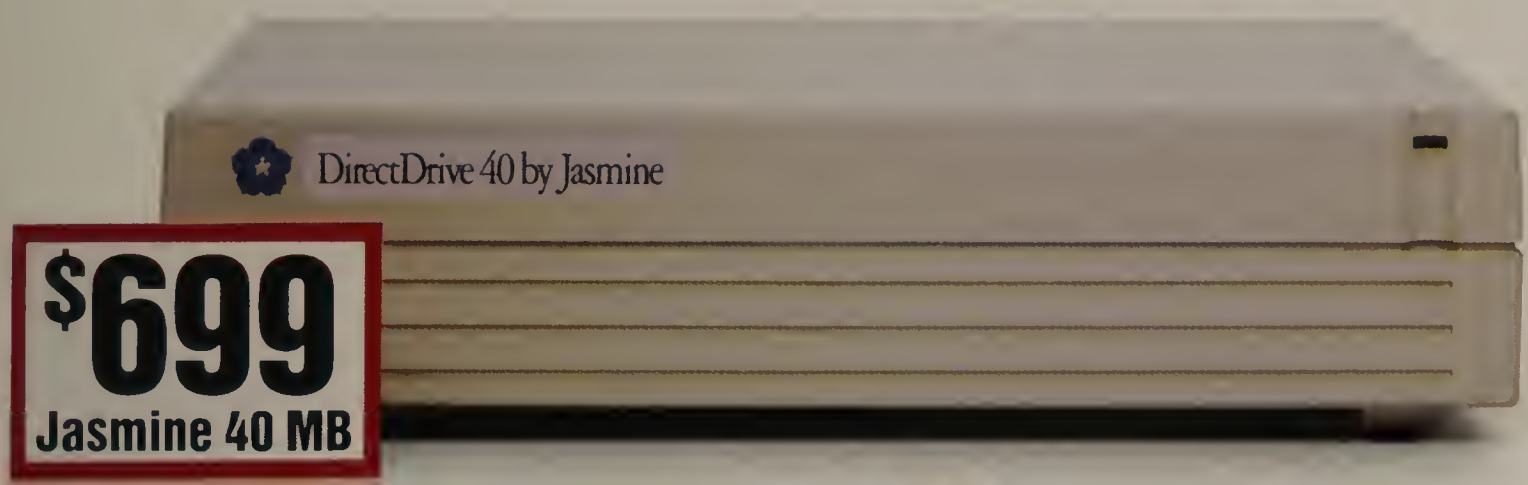

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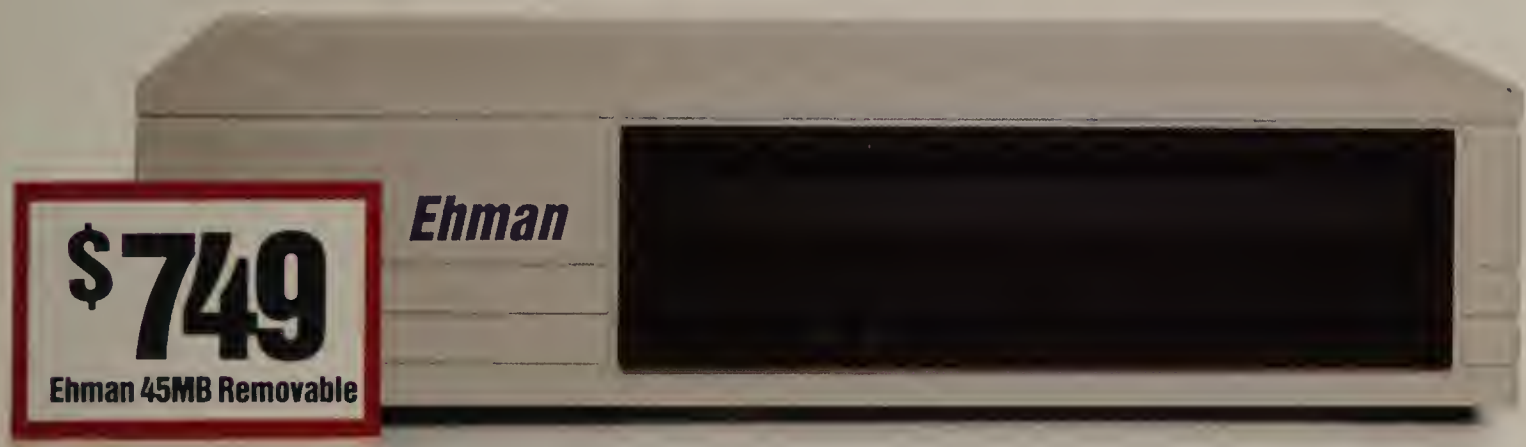

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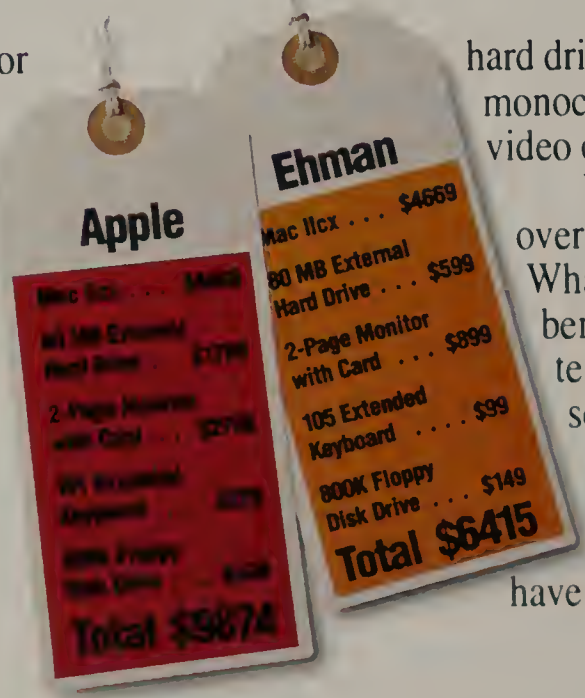

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